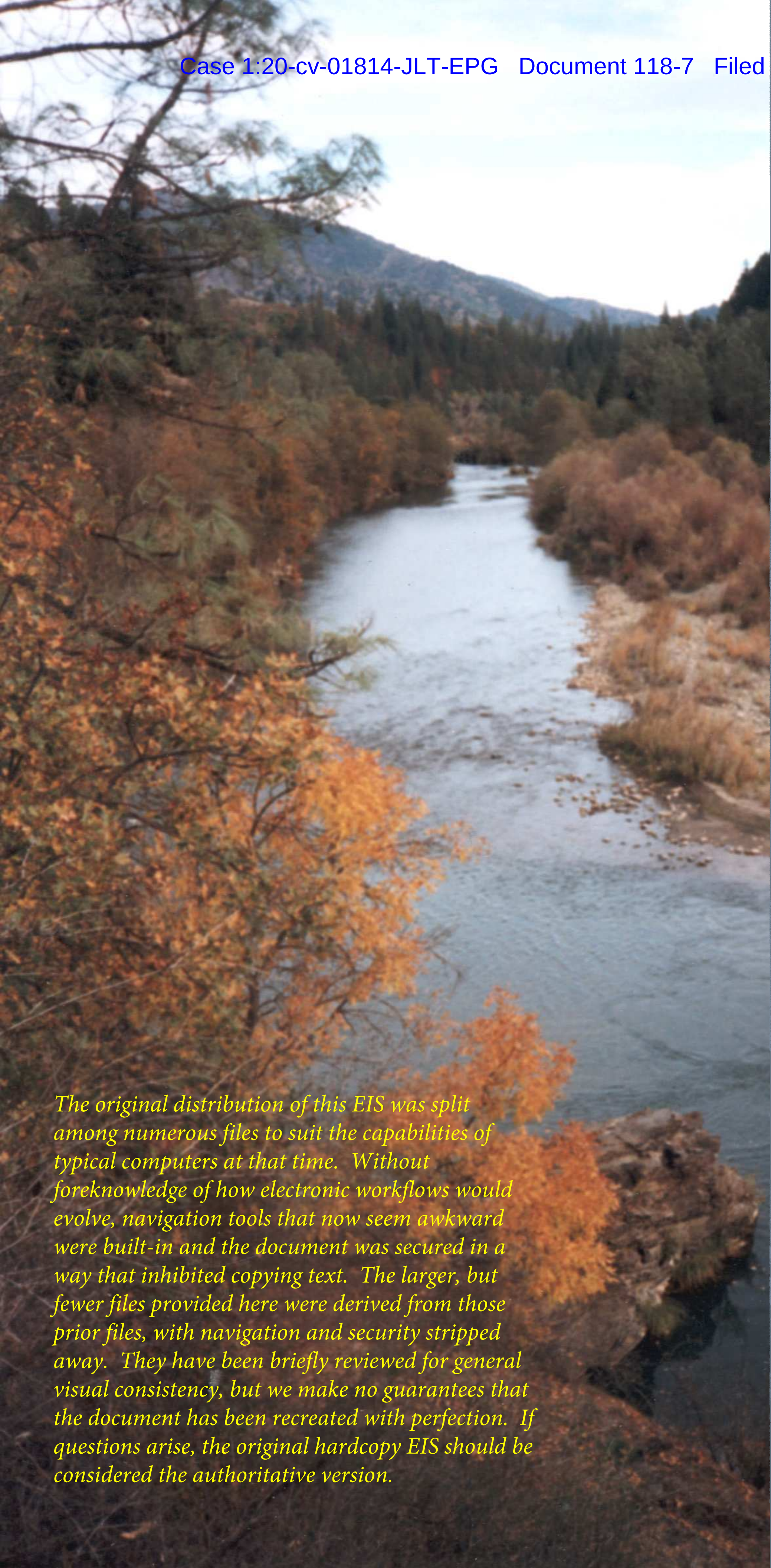

The original distribution of this EIS was split among numerous files to suit the capabilities of typical computers at that time. Without foreknowledge of how electronic workflows would evolve, navigation tools that now seem awkward were built-in and the document was secured in a way that inhibited copying text. The larger, but fewer files provided here were derived from those prior files, with navigation and security stripped away. They have been briefly reviewed for general visual consistency, but we make no guarantees that the document has been recreated with perfection. If questions arise, the original hardcopy EIS should be considered the authoritative version.

Lead Agencies:
U.S. Fish and Wildlife Service
U.S. Bureau of Reclamation
Hoopa Valley Tribe
Trinity County

FINAL

Trinity River Mainstem Fishery Restoration

Environmental Impact Statement/ Report

State Clearinghouse
No. 1994123009

October 2000

Abstract

The construction of the Trinity River Diversion (TRD) on the Trinity River and the export of approximately 74 percent of the Trinity's water above Lewiston dramatically reduced instream flows in the mainstem of the Trinity River. This reduction has resulted in substantial detrimental changes to the river, with associated declines in anadromous fish production. In its authorization for the construction and operation of the TRD, Congress also directed the Secretary of the Interior (Secretary) to ensure the preservation and propagation of Trinity fish and wildlife resources. In 1981, the Secretary, citing statutory requirements and Federal Tribal Trust obligations, directed the U.S. Fish and Wildlife Service (Service) to conduct the Trinity River Flow Evaluation Study (TRFES). The TRFES was initiated to determine the effectiveness of restoration of flows and other measures for the purpose of restoring salmon and steelhead populations to the river. In 1992, Congress enacted the Central Valley Project Improvement Act (CVPIA) (Public Law 102-575) which, in part, directed the Secretary to complete the TRFES, and with the concurrence of the Hoopa Valley Tribe, implement its recommendations for restoring and maintaining the Trinity River fishery.

In 1994, the Secretary, in accordance with the National Environmental Policy Act (NEPA) and Trinity County, in accordance with the California Environmental Quality Act (CEQA), initiated the Trinity River Environmental Impact Statement/ Report (EIS/ EIR) to evaluate a range of alternatives to restore the natural production of anadromous fish on the mainstem of the Trinity River. The Service was designated as the lead agency and the Hoopa Valley Tribe, Trinity County, and the U.S. Bureau of Reclamation (Reclamation) agreed to function as co-leads. On October 12, 1994, the Service published in the Federal Register a Notice of Intent (NOI) to prepare the Trinity River Mainstem Fishery Restoration EIS/ EIR. Trinity County filed a Notice of Preparation (NOP) of an EIR on November 15, 1994. The Draft EIS/ EIR (DEIS/ EIR) was released for public comment in October 1999.

This Final EIS/ EIR (FEIS/ EIR) amends the DEIS/ EIR in response to public comment and incorporates additional information, corrections, and changes. As such, this FEIS/ EIR hereby incorporates the DEIS/ EIR by reference. The FEIS/ EIR represents the environmental analysis to be used by the Secretary in making subsequent federal decisions necessary to restore and maintain the Trinity River fishery. Further, under CEQA, the FEIS/ EIR will provide Trinity County with an environmental reference for basing its decision on the issuance of permits for potential Trinity River channel modification projects that occur within the County's jurisdictional boundaries. In accordance with NEPA and CEQA, this FEIS/ EIR has identified a number of alternatives that, based on public input, scientific information, and professional judgment, are considered feasible and satisfy the stated purpose and need and goal and objectives of the proposed action. The FEIS/ EIR examines the affected environment and the environmental consequences for six alternatives: (1) No Action Alternative, (2) Maximum Flow Alternative, (3) Flow Evaluation (Preferred Alternative), (4) Percent Inflow Alternative, (5) Mechanical Restoration Alternative, and (6) State Permit Alternative (this alternative was determined not to meet the stated purpose and need of the action, but is included to account for Reclamation's existing diversion permit). In

addition, all alternatives were compared to the No Action and Existing Conditions scenarios, as is required by NEPA and CEQA, respectively. A brief summary of each alternative, along with a description of associated environmental impacts, follows.

The No Action Alternative represents ongoing activities and operations and the anticipated future condition of the affected environment in the year 2020 in the absence of project implementation. The No Action Alternative performed poorly in meeting the healthy river system attributes and habitat requirements necessary for restoring the natural production of anadromous salmonids in the mainstem Trinity River. Compared to 1995 existing conditions, the No Action Alternative showed adverse temperature-related impacts to Sacramento River salmon, caused by increased water demands in 2020. Modeling results indicated that fishery habitat in the mainstem Trinity River in the year 2020 would not provide the conditions necessary to restore and maintain salmonid populations, including the threatened (federal ESA) coho salmon population.

The Maximum Flow Alternative would use all of the Trinity River inflows above the Trinity Dam to restore the river ecosystem through managed flows. The Maximum Flow Alternative would enhance recreation, result in very substantial improvements to habitat for native anadromous salmonids in the Trinity River, and benefit anadromous fish in the lower Klamath River and coastal areas relative to the No Action Alternative. While this alternative would meet the purpose and need of the proposed action, the Maximum Flow Alternative would eliminate all water exports to the Central Valley, and was the only alternative that substantially increased temperature violations in the Sacramento River above the No Action levels. Further, the Maximum Flow Alternative shows significant adverse impacts related to TRD and CVP system power generation, Trinity River flooding, Sacramento River winter and spring chinook salmon and delta smelt, Central Valley water supply and associated impacts to Central Valley agricultural and municipal and industrial (M&I) uses, and Delta water quality.

The Flow Evaluation Alternative is based on the recommendations in the TRFES and includes increased releases from Lewiston Dam, mechanical restoration, and implementation of an adaptive environmental assessment and management (AEAM) program. Projected significant adverse impacts include impacts to Sacramento River winter chinook and delta smelt, a reduction in water deliveries to the Central Valley and associated impacts to Central Valley agricultural land use, power generation, and modeled impacts to Delta water quality above the No Action Alternative. The lead agencies chose the Flow Evaluation Alternative as the Preferred Alternative because it best met the purpose and need of restoring and maintaining the Trinity River fishery, in accordance with the statutory and federal trust obligations, while allowing for the continued operation of the TRD, including continuing to export the majority of Trinity Reservoir inflow and limiting flooding impacts on the Trinity River.

The Percent Inflow Alternative would approximate natural flow patterns, at a reduced scale, by releasing water into the Trinity River at a proportion of the rate it flows into the Trinity Reservoir. The Percent Inflow Alternative would meet the purpose and need of the proposed action and benefit the Trinity River fishery, albeit at a much lower percentage than the Maximum Flow and Flow Evaluation Alternatives. However, the Percent Inflow Alternative would include significant adverse impacts to the Trinity and Sacramento River

temperature objectives, the Sacramento River fishery, TRD power generation, Central Valley agricultural land use, and Delta water quality.

The Mechanical Restoration Alternative would use the same water management as the No Action Alternative, but would build upon No Action by constructing 47 new channel projects, mechanically maintaining both new and existing projects, dredging 10 pools in the Trinity River mainstem, and initiating an ambitious watershed protection program. Mechanical Restoration would result in some benefits to native anadromous species relative to the No Action Alternative. While this alternative would minimally meet the purpose and need of the proposed action, the benefits would be largely limited to restoration sites and would be substantially less than those seen under the Maximum Flow and Flow Evaluation Alternatives. Other anticipated impacts would be similar to the No Action Alternative.

The State Permit Alternative was evaluated because it identifies the minimum flow levels identified by Congress in 1955 and specified in Reclamation's seven California water permits issued in 1959. Under the State Permit Alternative, Trinity River instream flows would be reduced from the No Action levels of approximately 340 thousand acre feet (taf) of water per year to 120 taf. The State Permit Alternative would not meet the purpose and need of the proposed action, but could slightly benefit Sacramento River water quality and fisheries and Sacramento and Central Valley water resources and supply.

Contents

United States Department of the Interior

FISH AND WILDLIFE SERVICE

California/Nevada Operations Office
2800 Cottage Way, Suite W-2606
Sacramento, California 95825-1846

Dear Interested Party,

I am pleased to transmit to you the **Final Environmental Impact Statement (FEIS)/Report for the Trinity River Mainstem Fishery Restoration**. This EIS/R is prepared in compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). This document was prepared by the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, the Hoopa Valley Tribe and Trinity County.

The purpose of the FEIS is to evaluate various alternatives against a No Action alternative to identify the benefits and impacts of implementing the preferred alternative. This document will be considered by the Secretary of the Interior in making a decision as to what actions will be taken to restore the mainstem Trinity River.

Included in this mailing as an enclosure are two relevant Biological Opinions (from Fish and Wildlife Service and National Marine Fisheries Service) addressing Endangered Species Act compliance for the proposed preferred alternative.

For further information regarding this FEIS, please contact any of the four co-leads:

U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825-1898

U.S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825-1898

Trinity County Natural Resources Division
P.O. Box 156/98 A Clinic Ave
Hayfork, CA 96041-0156

Hoopa Valley Tribe
P.O. Box 417 Fisheries Building
Loop Road
Hoopa, CA 95546

Sincerely,

Mary Ellen Mueller

Mary Ellen Mueller
Fisheries Supervisor
California/ Nevada Operations Office

Report

Trinity River Mainstem Fishery Restoration

Final Environmental Impact Statement/Report

Lead Agencies:

U.S. Fish and Wildlife Service
U.S. Bureau of Reclamation
Hoopa Valley Tribe
Trinity County

State Clearinghouse
No. 1994123009

October 2000

Cover Sheet

Title of Proposed Action:	Trinity River Mainstem Fishery Restoration	
Responsible Officials: (Lead Agencies)	Mr. Michael Spear U.S. Fish and Wildlife Service Fisheries Supervisor 2800 Cottage Way Suite W-2606 Sacramento, CA 95825	Mr. Tom Stokely Trinity County Natural Resources Division P.O. Box 156/ 98 A Clinic Ave Hayfork, CA 96041-0156
	Mr. Lester Snow U.S. Bureau of Reclamation 2800 Cottage Way Suite E-1604 Sacramento, CA 95825	Mr. Mike Orcutt Hoopa Valley Tribe P.O. Box 417 Fisheries Building Loop Road Hoopa, CA 95546
Contacts: (Lead Agencies)	Mary Ellen Mueller U.S. Fish and Wildlife Service Fisheries Supervisor 2800 Cottage Way Suite W-2606 Sacramento, CA 95825	Mr. Tom Stokely Trinity County Natural Resources Division P.O. Box 156/ 98 A Clinic Ave Hayfork, CA 96041-0156
Legal Mandate:	National Environmental Policy Act of 1969, 42 U.S.C. 4321 et seq., and the California Environmental Quality Act, California Public Resources Code, Sections 21000 et seq.	
Location of Proposed Action:	Trinity County, California	

Chapter 1
Context

CHAPTER 1

Context

1.1 History of the Project

In 1994, the U.S. Fish and Wildlife Service (Service), Hoopa Valley Tribe, Trinity County, and U.S. Bureau of Reclamation (Reclamation) began work on the Trinity River Mainstem Fishery Restoration Draft Environmental Impact Statement/Environmental Impact Report (DEIS/EIR). The DEIS/EIR was initiated as a result of congressional mandates and statutory requirements to restore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of the Lewiston Dam. Since the construction of the dam, a number of studies, including an Environmental Impact Statement (EIS) released by the Service in November 1980 and the Trinity River Flow Evaluation Study (TRFES) released in June 1999, documented habitat loss and declining anadromous fish populations in the mainstem Trinity River.

The DEIS/EIR was undertaken to evaluate and disclose the potential environmental benefits and adverse impacts resulting from proposed actions to restore the fishery. These actions include mechanical restoration, implementation of the recommendations contained in the TRFES, and a range of other reasonable alternatives. The DEIS/EIR was prepared with the support of the Hoopa, Karuk, and Yurok Tribes and thirteen local, state, and federal agencies (either cooperating, responsible, or trustee agencies)[1]. The effort to collect, analyze, and present technical information was further complimented by six technical teams lead by representatives of the Service, Reclamation, Western Area Power Administration (Western), U.S. Army Corps of Engineers (Corps), and the U.S. Bureau of Land Management (BLM).

The Service, the designated lead agency under the National Environmental Policy Act (NEPA), began the public process on October 12, 1994, when it published a Notice of Intent (NOI) to prepare an EIS in the Federal Register (59 FR 25141). Shortly thereafter, Trinity County, the responsible California Environmental Quality Act (CEQA) agency, followed this action by forwarding a Notice of Preparation (NOP) of an EIR to the State Clearinghouse on November 16, 1994.

Soon after the publication of the NOI, a series of joint NEPA/CEQA scoping meetings were held in Willows, Weaverville, Hoopa, and Eureka, California from October 27, 1994 through November 3, 1994. Public input received during the meetings and subsequent follow-up letters helped the agencies identify potential environmental impacts and areas of concern. These concerns included: fishery resources, Tribal trust obligations, Central Valley Project (CVP) agricultural and municipal and industrial (M&I) water contractors, vegetation and wildlife resources, water quality and inriver temperature, water management, CVP power generation, recreation and recreation economics, socioeconomics, land use, Trinity River

[1] See Section 5.2 in Chapter 2 of this FEIS/EIR, Changes to the DEIS/EIR, for a list of involved agencies and individuals.

flooding, aesthetics (related to reservoir drawdown), ocean sport and commercial fishing, and upland watershed rehabilitation.

As the DEIS/EIR was being prepared, additional public meetings were held from March 25 through April 4, 1996, in Orleans, Eureka, Hoopa, Weaverville, Willows, Fresno, and Sausalito, California, and Coos Bay (Oregon). This series of meetings provided the public with additional opportunities for comment and included a discussion of preliminary TRFES recommendations, EIS/EIR alternatives, impact areas, and analytical methods. In addition, the meetings provided updates on the project schedule and recent legislative actions.

An update on the alternatives and information on preliminary analysis results was held at a second round of public meetings on October 28, 29, and 30, 1997, at Hoopa, Weaverville, and Sacramento, respectively. In addition, a public meeting was held in Weaverville on February 17, 1998, to present information on proposed significance criteria that had been developed to help identify the significance of the various impacts. A series of newsletters were mailed out to a large number of interested parties in January 1996, September 1996, and October 1997 to provide additional sources of public information. Distribution of news and information concerning the DEIS/EIR was supplemented in the fall of 1998 when the Service posted an Internet web page at http://www.ccfwo.r1.fws.gov/ccfwo/treis.htm. Trinity County also provided electronic access to information concerning Trinity River activities by maintaining a public list server known as "env-trinity" available through subscription to majordomo@igc.apc.org.

On October 19, 1999, the Service published a notice in the Federal Register announcing the availability of the draft document and the commencement of the public comment period (64 FR 56364). In addition, news releases and articles announcing the availability of the DEIS/EIR were published in several area newspapers including the Trinity Journal, Sacramento Bee, San Francisco Chronicle, Eureka Times-Standard, and the San Jose Mercury News. The document was made available for public review at libraries and other public places in California and in Coos Bay and Portland, Oregon. In addition, 754 hard copies of the document, as well as 470 copies of the Executive Summary and 225 electronic versions of the DEIS/EIR on CD-ROM, were distributed to interested individuals, organizations, and agencies. A complete series of technical appendices were also included as part of the CD-ROM, and hardcopy versions of the appendices were also made available to the public and interested agencies upon request.

The public comment period included a series of joint NEPA/CEQA public hearings held in Redding, Sacramento, and Eureka on November 16, 18, and 23, 1999, respectively. In addition, the Trinity County Board of Supervisors held a CEQA meeting in Weaverville, California, on December 7, 1999. These meetings provided the public with an opportunity to submit both written and oral comment to the lead agencies. The comment period was originally scheduled to end on December 8, 1999. However, on December 2, 1999, the Service extended the period until December 20, 1999 (64 FR 67584). Public technical workshops were held in Sacramento on December 6, 1999, and in Weaverville on December 7, 1999. On December 27, 1999, the Service published a notice in the Federal Register to reopen the public comment period until January 20, 2000 (64 FR 72357). Public notices regarding the hearings and extensions were also published in the aforementioned newspapers and the Redding Record Searchlight.

In response to the public outreach effort, the lead agencies received a substantial number of letters and postcards commenting on the DEIS/EIR. In total, the lead agencies received written comments from 6,445 people and organizations (1,009 letters and 5,436 preprinted postcards). A list of the commentors and the response of the agencies to each of those comments is presented in Chapter 4 of this FEIS/EIR, Appendix D.

1.2 Relationship to Other Documents and Necessary Decisions

This Final Environmental Impact Statement/Environmental Impact Report (FEIS/EIR) amends the DEIS/EIR in response to public comment and incorporates additional information, corrections, and changes. As such, this FEIS/EIR hereby incorporates the DEIS/EIR by reference. All portions of the DEIS/EIR should be considered valid and applicable except for those changes made explicitly herein. Although a number of revisions have been made in developing the FEIS/EIR, none of the revisions are sufficiently substantial or significant so as to require recirculation. For further information regarding recirculation, see thematic response titled "Requests for Recirculation" in Appendix D of this FEIS/EIR.

This FEIS/EIR functions as both a project-level FEIS/EIR and a programmatic FEIS/EIR. As both a project-level and programmatic FEIS/EIR, this document is intended to provide full environmental review for policy decisions associated with changing Trinity River flows, managing the Trinity River Division (TRD) to meet such flows, and the impact such flows could have on dependent uses of Trinity River water. However, as a programmatic FEIS/EIR, this document is intended to provide only first-tier review for the mechanical rehabilitation projects, dam modifications, spawning gravel placement, modifications to structures in the floodplain, and other site-specific activities.

The Secretary of the Interior will issue a Record of Decision (ROD) no less than 30 days after the date on which this FEIS/EIR becomes available to the public. Because the Trinity River FEIS/EIR is a non-delegated NEPA action, signatory approval is required from both the Assistant Secretary for Water and Science and the Assistant Secretary for Fish, Wildlife, and Parks. The lead CEQA agency will certify the EIR no less than 10 days after providing written response to comments received from responsible state agencies and other commenting agencies.

As required under the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.), implementation of the selected alternative required consultation with the Service and the National Marine Fisheries Service (NMFS) on impacts to endangered, threatened, and proposed species. Furthermore, implementation of the selective alternative could require a number of permits and agency consultation and approval under other "cross-cutting" local, state, and federal laws. Agencies with potential permit and approval requirements include, but are not limited to, Trinity County, the California North Coast Regional Water Quality Control Board (NCRWQCB), the State Lands Commission (SLC), and the Corps.

A number of other projects with a direct and/or indirect relationship to the Trinity River are currently under environmental review. These projects include the CVPIA Final Programmatic EIS and ROD, the CALFED San Francisco Bay/Sacramento-San Joaquin Delta (Bay-

Delta) program, and ongoing issues related to the operation of the Klamath Project. However, this FEIS/EIR is not tiered to these projects. Nevertheless, the Service, Reclamation, and other involved parties are making efforts to fully coordinate the analyses, models, data and assumptions for this FEIS/EIR and other potentially related projects that are currently under review.

1.3 Description of the FEIS/EIR Format

This FEIS/EIR contains much of the typical introductory material that preceded this section (e.g., title page, cover sheet, abstract, and table of contents). Following this section is the body of the FEIS/EIR. The outline is identical to that of the DEIS/EIR. For each section that does not differ from the DEIS/EIR to the FEIS/EIR, the term "*NO CHANGE*" is used to designate that section. Where a change is being incorporated from what was presented in the DEIS/EIR, that change is presented and discussed. First, the nature of the change is often discussed (e.g., a paragraph being appended, a sentence is being revised, a table or figure is corrected). Next, the reason for the change may be discussed briefly. Last, the change itself is presented in redline/strikeout format. Shaded (highlighted) words and characters are additions, and the words and characters that are lined through (~~strikeout~~) are deletions. Following Chapter 2, Changes to the DEIS/EIR, Chapter 3 lists the index to this FEIS/EIR document.

There are four appendices to this document. Appendix A includes the distribution list for the FEIS/EIR and the DEIS/EIR distribution report, which lists the names of organizations and individuals who received the document for review and comment. Appendix B contains the Biological Assessment. Appendix C includes the Trinity River Implementation Plan and AEAM Plan. Appendix D consists of three sections: (D1) the names of organizations and individuals who submitted comments to the DEIS/EIR ("commentors"), (D2) thematic responses (responses designed to address certain types of comments submitted by individuals and various organizations that are substantially similar in their subject matter and the concerns they raise), and (D3) the public comments received and the agencies' and tribes' responses to those comments.

Chapter 2
Changes to the DEIS/EIR

Chapter 2 Contents

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Section

Tables

Chapter 2 Contents, continued

Chapter 2 Contents, continued

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Figures

CHAPTER 2

Changes to the DEIS/EIR

2.1 Changes to the DEIS/EIR—Executive Summary

Introduction *(NO CHANGE)*

Purpose and Need for the Action *(SEE SUBSECTIONS)*

Tribal Trust
pg. ii

The Hoopa Valley Indian Reservation was established in 1864. The reservation generally consists of a ~~12-mile-square~~ 144-square-mile block of land bisected by the lower Trinity River. In 1988, Congress, via the Hupa-Yurok Settlement Act (P.L. 100-580), established the Yurok Indian Reservation, which is bisected by the lower Klamath River. Several court rulings have established that an important Indian purpose for the reservations was to reserve the tribes=rights to take fish from the Klamath and Trinity Rivers.

Description of Alternatives *(SEE SUBSECTIONS)*

Preferred Alternative
pg. iv

The Flow Evaluation Alternative, coupled with additional watershed protection efforts (described in the Mechanical Restoration Alternative), was identified as the preferred alternative because it best meets the purpose, need, goals, and objectives, while also minimizing adverse impacts. In addition, the preferred alternative achieved the following screening criteria, which were jointly developed by the four co-leads (Service, Reclamation, Hoopa Valley Tribe, and Trinity County). The preferred alternative:

- Substantially increases natural production of anadromous fish on the Trinity River mainstem
- Substantially restores inriver and ocean fishing opportunities
- Improves tribal access to trust resources
- Balances environmental and social beneficial and adverse impacts across the Trinity River Basin, Lower Klamath River Basin/Coastal Area, and the Central Valley Basin while meeting the mandate from the SWRCB in Water Rights Orders 90-05 and 90-01 to cause no harm to the Trinity River fishery as a result of diversions to the Sacramento River for temperature control
- Allows for the continued operation of the TRD including water exports
- Limits flooding impacts on the Trinity River

pg. v

The following text has been added immediately above No Action Alternative:

The 600 thousand acre-feet (taf) carryover storage level associated with the Flow Evaluation Alternative would be maintained for the Preferred Alternative except in exceedingly dry years if deemed necessary to avoid potentially infeasible operations at Shasta Dam. In such years (identified as potentially occurring in the future per the modeling analysis under the cumulative scenario), carryover storage would be reduced to 400 taf.

pgs. vi through viii

Table ES-1 has been modified to include Hoopa Valley Tribe temperature standards and additional information, and to correct some values. See revised Table ES-1 at the end of this section.

Affected Environment and Environmental Consequences *(SEE SUBSECTIONS)*

Water Resources **(CHANGES FOLLOW)**

pg. xi

Central Valley. Under No Action and Mechanical Restoration the TRD would divert approximately ~~900~~ 870 taf annually to the Central Valley (actual diversions may be less due to spills and Safety of Dam criteria). Under Maximum Flow, Flow Evaluation, Percent Inflow, and State Permit the TRD would divert ~~0, 655, 750, and 1130 taf~~ 0, 630, 730, and 1,070 taf, respectively. Maximum Flow, Flow Evaluation, and Percent Inflow would reduce the amount of water delivered to CVP contractors and Delta inflow. Under No Action conditions, groundwater pumping, and associated land subsidence, would increase in some parts of the Central Valley (e.g., Yolo, San Joaquin/Tulare areas due to increased water demand driven by population growth. Maximum Flow would substantially exacerbate these effects. Flow Evaluation and Percent Inflow would result in localized groundwater elevation declines and land subsidence compared to No Action. Impacts would be most substantial in the vicinity of areas dominated by water service contractors who are assumed to increase groundwater pumping in response to reduced CVP deliveries.

Water Quality **(CHANGES FOLLOW)**

pgs. xi and xii

The primary water quality concerns in the DEIS/EIR are Trinity and Sacramento River water temperatures, Trinity River turbidity, and Bay-Delta salinity levels. Criteria regarding Trinity River temperature, turbidity, and sediment are administered by the North Coast Regional Water Quality Control Board and the Hoopa Valley Tribe. The temperature criteria were established to maintain cool water temperatures for the benefit of the fishery. In regards to the Sacramento River, the 1993 biological opinion on CVP operational impacts to the endangered winter run chinook salmon is a significant management criteria. The opinion requires certain temperatures at various points in the Sacramento River for the conservation of the species, and that Shasta Reservoir be operated to maintain at least 1.9 maf of storage on September 30. TRD exports are used in conjunction with Shasta releases to assist in meeting the criteria.

Trinity River Basin. Flow Evaluation meets the state temperature criteria 99 percent or more of the time in all water-year classes except critically dry, where the criteria are met 94 percent of the time. That compliance rate is substantially better than all the other alternatives including No Action. The improvement is in large part, due to shifting TRD diversions from spring to summer, thereby not allowing water to warm in Lewiston Reservoir. Use of Trinity Powerplant bypass operations increases Flow Evaluation compliance with state temperature criteria to 100 percent in all water-year classes, but no improvement was seen with bypasses for Percent Inflow and Maximum Flow. Flow Evaluation meets the Hoopa Valley Tribe's temperature criteria an average of 92 percent of the time, with Maximum Flow showing the best compliance at 96 percent. No Action, State Permit, and Percent Inflow meet tribal temperature criteria an average of 83 percent, 78 percent, and 82 percent of the time, respectively. Short-term exceedance of the state turbidity criteria could occur as a result of the channel rehabilitation projects in Flow Evaluation, Percent Inflow, and Mechanical Restoration. These projects would undergo site-specific environmental review that could include mitigating measures to reduce turbidity. The watershed protection work in Mechanical Restoration would reduce sediment inputs into tributaries, and subsequently, into the Trinity River by 240,000-480,000 yd^3/yr, which is approximately 9-17 percent of the average annual sediment produced in the basin.

Central Valley. Model simulations indicate that increased water demands due to population growth and other factors not related to the alternatives in the DEIS/EIR would increase temperature violations in the Sacramento River from 14 to ~~20~~ 16 percent from 1995 to 2020. Flow Evaluation increased the violation frequency to 20.5 percent, with all other alternatives having less impact, except Maximum Flow, which increased to 22.8 percent. ~~Maximum Flow was the only alternative that substantially increased violations above No Action levels. Similarly, only~~ Maximum Flow was the only alternative that increased Shasta carryover violations. Maximum Flow would result in the largest reduction in Delta inflows, and therefore, the most adverse impacts to Delta water quality conditions. The Flow Evaluation and Percent Inflow alternatives were also identified to have modeled impacts to Delta water quality.

Fishery Resources **(CHANGES FOLLOW)**
pg. xiii

Implementation of the alternatives for purposes of restoring the natural production of anadromous fish in the Trinity River could also effect other fish populations in the river, in the TRD reservoirs, and in the Central Valley and Bay-Delta. Federally listed species that could be indirectly impacted include the endangered Sacramento River winter run chinook~~,~~ and threatened Sacramento River spring run chinook salmon, Delta smelt, and Sacramento splittail.~~, and the proposed spring and fall runs of the Central Valley chinook.~~ Species proposed for federal listing that could be indirectly impacted include the fall run of the Central Valley chinook salmon.

Tribal Trust **(CHANGES FOLLOW)**
pg. xiv

The importance of the Trinity and Klamath Rivers to the Hoopa and Yurok Tribes is evident by the location and shape of the reservations. The ~~12-mile-square~~ 144-square-mile Hoopa

Valley Indian Reservation is bisected by the lower portion of the Trinity River and the Yurok Reservation is bisected by the Klamath River from its mouth to the confluence with the Trinity. A wide variety of trust assets, ranging from fish to riparian plants to wildlife, could be affected by the alternatives. Therefore, it was decided to use the healthy alluvial river model as a tool for assessing impacts to tribal assets. The DEIS/EIR focuses on the Hoopa Valley and Yurok Tribes; however, the alternatives could indirectly affect other tribes in the region.

Vegetation, Wildlife, and Wetlands *(NO CHANGE)*

Recreation **(CHANGES FOLLOW)**
pg. xv

Trinity River Basin. All of the alternatives showed some benefits and some adverse impacts to recreation opportunities on the Trinity River, depending on the activity, time of year, and water-year class. Maximum Flow showed substantial improvement in terms of river use and benefits, but adverse impacts at Trinity Reservoir due to the large fluctuations in reservoir levels which makes boat ramps unusable substantially more often than is expected under No Action. Flow Evaluation was the only alternative to show increases in recreation use and benefits at both the river and ~~the~~ reservoir, with reservoir recreation use and benefits changing less than 1 percent. State Permit showed the most adverse impacts on the river by a substantial amount (it essentially ended sport fishing), but it showed the largest increase in reservoir use and benefits, although by a comparatively smaller margin. The Trinity River is designated a federal and state Wild and Scenic River, primarily due to its fishery. Maximum Flow and Flow Evaluation would be substantially better at meeting the purposes of the designation than would the other alternatives.

Land Use **(CHANGES FOLLOW)**
pg. xvi

Trinity River Basin. Scheduled peak releases under No Action would not flood existing residences and structures along the Trinity River; however, uncontrolled operational spills have historically inundated such areas and could occur again in the future. Maximum Flow would cause the most flood damage, followed by Percent Inflow, Flow Evaluation, State Permit, and Mechanical Restoration, in that order. Maximum Flow would make inaccessible 79 properties due to road and bridge flooding. Flooding impacts associated with Percent Inflow would be larger than Flow Evaluation (even though their peak releases are comparable) because the peak releases would likely coincide with high tributary inflows. Impacts under State Permit could be slightly higher than No Action (even though scheduled peak releases are less) due to the increased likelihood of major spill events. No impacts to M&I or agricultural lands are anticipated. ~~Based on the assumption that real estate values along the Trinity River would improve indirectly with increases in fish production, Maximum Flow and Flow Evaluation ranked highest in increasing property values.~~ Based on the assumption that the value of real estate adjacent to the Trinity Reservoir would increase with decreasing range of reservoir surface-water fluctuations, Flow Evaluation ranked first overall in increasing property values, followed by Maximum Flow, Percent Inflow and State Permit (tied), and No Action and Mechanical Restoration (tied).

Power Resources *(NO CHANGE)*
Socioeconomics *(NO CHANGE)*
Cultural Resources *(NO CHANGE)*

Air Quality **(CHANGES FOLLOW)**
pgs. xviii and xix

Trinity River Basin. Flow Evaluation, Percent Inflow, and Mechanical Restoration could all result in some increase to airborne particulate matter (PM) as a result of activities associated with the channel rehabilitation sites (e.g., access road building), acquisition and transportation of spawning gravel, dam improvements (Maximum Flow Alternative only) and other actions involving heavy machinery. Mechanical Restoration impacts would likely be greater since the alternative includes an extensive watershed protection program and perpetual mechanical maintenance of channel rehabilitation sites.

Environmental Justice *(NO CHANGE)*
Other Impacts and Commitments *(SEE SUBSECTIONS)*

Cumulative Impacts **(CHANGES FOLLOW)**
pg. xix

Cumulative impacts are the impacts on the environment which result from the incremental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or entity undertakes such other actions. The proposed action in the DEIS/EIR may be implemented in an interactive manner with other concurrent projects. In addition, those other projects may affect the impacts of the proposed action. The cumulative impact analysis addressed impacts associated with several related actions including:

- Implementation of CVPIA, including evaluation of the 3406(b)(2) water management for upstream and Delta actions similar to those defined in the November 20, 1997 Administrative Paper released by Reclamation and the Service, as well as the October 5, 1999 Decision on Implementation of Section 3406(b)(2) of the CVPIA
- SWRCB water rights process
- CALFED Bay-Delta Program
- Deregulation of the electric industry in California
- Changes in federal farm support programs
- Changes in demand for agricultural products
- Changes to fisheries management
- Changes in demand/supply for timber products
- Changes in demand for recreational activities in the Trinity River Basin not related to the Trinity River or the mainstem reservoirs
- Changes in Trinity River Basin Consumptive Water Use

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Table ES-3 has been modified to correct CVP deliveries with cumulative impacts under each period. See revised Table ES-3 at the end of this section.

Table ES-4 has been modified to correct an omission and now includes environmental impacts and proposed mitigation for groundwater, water quality, and fishery resources. See revised Table ES-4 at the end of this section.

TABLE ES-1
Summary of Impacts

Issue	Hydrologic Conditions or Other Variable	No Action in Year 2020	Compared to No Action: Maximum Flow	Flow Study	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative to Existing Conditions
Releases into Trinity River	Critically Dry	340,000 af	+36%	+9%	-51%	0%	-65%	+9%
	Dry	340,000 af	+160%	+33%	-5%	0%	-65%	+33%
	Normal	340,000 af	+250%	+~~87~~ 90%	+30%	0%	-65%	+87%
	Wet	340,000 af	+340%	+110%	+93%	0%	-65%	+110%
	Extremely Wet	340,000 af	+530%	+140%	+190%	0%	-65%	+140%
Trinity River Exports to Central Valley	Dry Periods	540,000 af	-100%	-30%	-2%	0%	+39%	-28%
	Long-term Average	870,000 af	-100%	-28%	-16%	0%	+23%	-28%
Trinity Reservoir Elevation on Sept. 30	Dry Periods	~~2,207'~~ 2,214' msl	+~~64'~~ 57'	+~~18'~~ 11'	+~~25'~~ 18'	No Change	+~~11'~~ 4'	+8'
	Long-term Average	~~2,282'~~ 2,285' msl	~~-9'~~ 12'	+~~2'~~ -1'	+~~4'~~ 1'	No Change	+~~11'~~ 8'	-3'
Shasta Reservoir Elevation on Sept. 30	Dry Periods	933' msl	-65'	-11'	-1'	No Change	+3'	-17'
	Long-term Average	992' msl	-15'	-3'	No Change	No Change	+4'	-6"
Delta Inflow	Dry Periods	11,830,000 af	-2%	-1%	0%	0%	+2%	-1 ~~0~~%
	Long-term Average	22,570,000 af	-4%	-1%	-1%	0%	+1%	-1%
Delta Outflow	Dry Periods	6,320,000 af	-1%	0%	0%	0%	-1%	0%
	Long-term Average	14,710,000 af	-3%	-1%	-1%	0%	+1%	-4%
Exports at Tracy and Banks Pumping Plants in the Delta	Dry Periods	3,670,000 af	-5%	-2%	0%	0%	+6%	-3%
	Long-term Average	5,950,000 af	-6%	-1%	0%	0%	+1%	+6%
CVP Deliveries North of Delta	Dry Periods	2,680,000 af	-6%	-4%	0%	0%	+2%	+8%
	Long-term Average	3,120,000 af	-4%	-1%	0%	0%	+1%	11%
CVP Deliveries South of Delta	Dry Periods	1,580,000 af	-13%	-3%	+1%	0%	+13%	-6%
	Long-term Average	2,570,000 af	-13%	-2%	0%	0%	+2%	-3%

TABLE ES-1
Summary of Impacts

Issue	Hydrologic Conditions or Other Variable	No Action in Year 2020	Compared to No Action: Maximum Flow	Flow Study	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative to Existing Conditions
Days with Trinity River Temperature Violations—State standards (percent of the year in violation of Hoopa Valley Tribe temperature standards)	Critically Dry	78% (12%)	29% (0%)	6% (8%)	100% (13%)	78% (12%)	100% (12%)	84% (12%)
	Dry	24% (8%)	29% (2%)	1% (6%)	87% (12%)	24% (8%)	43% (15%)	0% (8%)
	Normal	2% (31%)	28% (6%)	1% (15%)	86% (29%)	2% (31%)	61% (35%)	3% (31%)
	Wet	0% (27%)	28% (6%)	0% (8%)	72% (23%)	0% (27%)	86% (31%)	0% (27%)
	Extremely Wet	0% (0%)	73% (10%)	0% (0%)	53% (6%)	0% (0%)	59% (6%)	0% (0%)
Months Sac. River Temp. Violations	Long-term Average	~~20~~16%	23%	20%	20%	20%	16%	14%
Years Shasta Res. Carryover Violations	Long-term Average	12%	14%	12%	12%	12%	10%	9%
Trinity Escapement as % of TRRP[a] Goals	-	.08	.81	.66	.23	.18	.00	.08
Trinity River Fish Harvested	-	11,300	+909%	+741%	+186%	+117%	-100%	0%
Ocean Sportfishing Benefits (millions)	-	$~~35.2~~ 42.2	+~~16~~ 15%	+~~15~~ 14%	+12%	+~~12~~ 11%	~~-10~~ 11%	40%
Gross Commercial Salmon Revenue (millions)	-	$19.0	+45%	+41%	+28%	+26%	-37%	-
Index of Restoration of Trinity River Tribal Assets	-	.08	.81	.66	.23	.18	.00	.08
Rank of ability to Restore Vegetation to Pre-Dam Conditions	-	5	1 (Best)	2	3	4	6	5
Trinity River Visitor Days	-	317,200	+33%	+22%	-2%	0%	-39%	+79%

TABLE ES-1
Summary of Impacts

			Compared to No Action					Preferred
Issue	**Hydrologic Conditions or Other Variable**	**No Action in Year 2020**	**Maximum Flow**	**Flow Study**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**	**Alternative to Existing Conditions**
Lower Klamath River Visitor Days	-	13,200	+28%	+24%	+8%	+5%	-5%	+84%
Trinity Reservoir Visitor Days	-	~~796,200~~ 803,600	-~~4~~ 5%	+~~1~~ 0%	+~~2~~ 1%	0%	+~~6~~ 5%	+66%
Shasta Reservoir Visitor Days	-	5,682,700	-8%	-2%	0%	0%	+2%	+60%
Flooding Impacts to Trinity River (excluding spills)	Properties/Cost (millions)	0/0	112/$14.3	1/$5.0	16/$6.0	0/0	0/0	0/0
CVP M&I Deliveries to Sacramento Valley	Dry Periods	82,000 af	-17.8%	-12.2%	+1.5%	0%	+7.9%	-9%
	Long-term Average	106,000 af	-13.3%	-3.5%	-0.6%	0%	+2.4%	-22%
CVP M&I Deliveries to San Joaquin Valley	Dry Periods	21,000 af	-1.2%	-0.4%	+0.4%	0%	+2.1%	-14%
	Long-term Average	27,000 af	-2.2%	-0.4%	-0.1%	0%	+0.5%	-11%
CVP M&I Deliveries to Bay Area	Dry Periods	231,000 af	-35.6%	-22.4%	+4.7%	0%	+20.7%	+8%
	Long-term Average	279,000 af	-24.8%	-5.1%	-0.3%	0%	+5.1%	-6%
San Joaquin Valley Agriculture (millions)	Dry Periods	$5,168	+0.1%	+0.1%	0.0%	0%	+0.1%	+15.6%
	Long-term Average	$5,195	-0.2%	0.0%	0.0%	0%	+0.0%	+15.6%
Tulare Basin Agriculture (millions)	Dry Periods	$4,513	+0.2%	+0.1%	0.1%	0%	+0.1%	+18.4%
	Long-term Average	$4,557	-0.1%	0.0%	0.0%	0%	+0.0%	+17.8%
San Felipe Unit Agriculture (millions)	Dry Periods	$63	-25.8%	-9.9%	+3.6%	0%	+37.8%	-16.4%
	Long-term Average	$98	-31.1%	-6.0%	-1.6%	0%	+5.2%	-9.8%
CVP Hydropower Energy	Dry Periods	2,946 GWh	-25%	-7%	+1%	0%	+9%	-
	Long-term Average	5,169 GWh	-21%	-6%	-3%	0%	+4%	-
Value of Hydro-power (millions)	Long-term Average		-$26.0	-$5.6	-$7.0	$0	+$5.9	$9,029
Cost per MWh for Ave. Customer	Synthetic Ave. Year		+$0.96	+$0.21	+$0.26	$0	-$0.22	$0.33

TABLE ES-1
Summary of Impacts

Issue	Hydrologic Conditions or Other Variable	No Action in Year 2020	Compared to No Action: Maximum Flow	Flow Study	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative to Existing Conditions
Implementation Costs 1998-2020 (excluding mitigation and ongoing TRRP[a] projects)	Total Cost 1998-2020 (millions)	$1.5	$30.3-$80.2	$71.8-$115.8	$13.8	$74.3	$1.6	-
	Major Expense	Spawning Gravel	Modify Dams and Spawning Gravel	Channel Rehab. and Adaptive Manage.	Channel Rehab-ilitation	Channel Rehab. and Watershed Protection	Spawning Gravel	-

[A]Trinity River Restoration Program

[B]~~Trinity River Restoration Program~~

[c]Mitigation includes residence and bridge relocation/modification, reservoir boat ramp modification, and other costs. Other TRRP projects include dredging of sediment ponds, operation of Buckhorn Dam, operation of the Trinity River Salmon and Steelhead Hatchery, and other projects.

TABLE ES-3
Cumulative Impact Water Deliveries

	Simulated Annual CVP Deliveries[a] (taf)			
Type of Period	**1995 Existing Conditions**	**No Action in 2020**	**Preferred Alternative in 2020**	**With Cumulative Impacts**
Long-term Average	5,380	5,690	5,600	~~5,580~~ 5,460
Dry Period	4,020	4,260	4,100	~~3,980~~ 3,870
Wet Period	5,860	6,200	6,180	~~6,380~~ 6,270

[A]CVP deliveries include deliveries to Agricultural and M&I Water Service Contractors, Sacramento River water rights contractors, other water rights contractors, and San Joaquin River Exchange Contractors. CVP deliveries do not include refuge water supplies.

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		Water Resources	
Groundwater			
Maximum Flow Flow Evaluation Percent Inflow	Significant declines in groundwater levels could occur in the Sacramento Valley and Tulare Basin regions, primarily in areas receiving CVP agricultural service contract water.	Although changes to surface water supply *per se* were not considered an impact, the development of additional water supplies to meet demands would lessen the associated impacts (e.g., groundwater impacts). A number of demand- and supply-related programs are currently being studied across California, many of which are being addressed through the ongoing CALFED and CVPIA programs and planning processes. Although none of these actions would be directly implemented as part of the alternatives discussed in this DEIS/EIR, each could assist in offsetting impacts resulting from decreased Trinity River exports. Examples of actions being assessed in the CALFED and CVPIA planning processes include: • Develop and implement additional groundwater and/or surface-water storage. Such programs could include the construction of new surface reservoirs and groundwater storage facilities, as well as expansion of existing facilities. Potential locations include sites throughout the Sacramento and San Joaquin Valley watersheds, as well as the Delta. • Purchase long- and/or short-term water supplies from willing sellers (both in-basin and out-of-basin) through actions including, but not limited to, temporary or permanent land fallowing. • Facilitate willing buyer/willing seller inter- and intra-basin water transfers that derive supplies from activities such as conservation, crop modification, land fallowing, land retirement, groundwater substitution, and reservoir re-operation. • Promote and/or provide incentive for additional water conservation to reduce demand. • Decrease demand through purchasing and/or promoting the temporary fallowing of agricultural lands. • Increase water supplies by promoting additional water recycling.	Significant
Maximum Flow Flow Evaluation Percent Inflow	The groundwater level declines could result in increased land subsidence within limited areas within the San Joaquin Valley and Tulare Basin regions.	See above.	Significant
Maximum Flow	Additional groundwater pumping could	See above.	Significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Flow Evaluation Percent Inflow	result in upwelling of groundwater high in ~~TSD~~ TDS into productive groundwater zones within limited areas within the San Joaquin Valley and Tulare Basin regions.		
		Water Quality	
Flow Evaluation Mechanical Restoration Percent Inflow	The channel rehabilitation projects would result in short-term Trinity River turbidity impacts.	• A 401 water quality certification would be obtained from the NCRWQCB, and a construction procedure would be developed to meet the Basin Plan turbidity requirements. Monitoring would be conducted as specified by the NCRWQCB, and efforts would be taken to reduce levels if they are 20 percent or more over background (e.g., isolating the work area and/or slowing or halting construction until the 20-percent level is achieved). • Notify individual diverters with state diversion permits within 2 miles downstream of any mechanical channel rehabilitation activity at least 2 days in advance of activities likely to produce turbidity.	Less than significant
Maximum Flow Flow Evaluation Percent Inflow	Violate temperature objectives and carryover storage criteria established in the Sacramento River winter run chinook salmon Biological Opinion.	Significant[a] impacts identified for the increased frequency of temperature and carryover storage violations ~~would need to be~~ were evaluated by ~~the~~ NMFS. ~~Such consultation could result in modification of the existing Biological Opinion. Given the result of this consultation is unknown, this significant impact is considered to be unmitigable at this time.~~ See mitigation for water quality fish-related impacts under Fishery Resources. (See also water supply related impacts under Groundwater.)	Significant[a]
Maximum Flow Percent Inflow State Permit	Violate state temperature objectives established for the Trinity River.	Significant impacts identified for violation of state temperature objectives would be evaluated by the NCRWQCB. Consultation with NMFS would occur pursuant to Trinity River coho salmon. Bypassing the Trinity Powerplant could offset impacts to temperature in the Trinity River. Preliminary analysis of powerplant bypasses indicates that pulling colder water from lower in the reservoir could alleviate temperature impacts. Further evaluation of the benefits and costs would be needed before a full assessment could be made. Given the result of consultations and bypass analysis is unknown, this significant impact is considered to be unmitigable at this time.	Significant
Maximum Flow Percent Inflow State Permit	Violate Hoopa Valley Tribe temperature objectives established for the Trinity River.	Significant impacts identified for violation of tribal temperature objectives would be evaluated by the Hoopa Valley EPA. Consultation with NMFS would occur pursuant to Trinity River coho salmon. Bypassing the Trinity Powerplant could offset impacts to temperature in the Trinity River. Preliminary analysis of powerplant bypasses indicates that pulling colder water from lower in the reservoir could alleviate temperature impacts. Further	Significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		evaluation of the benefits and costs would be needed before a full assessment could be made. Given the result of consultations and bypass analysis is unknown, this significant impact is considered to be unmitigable at this time.	
		Fishery Resources	
Native Anadromous Species			
State Permit	Would affect native anadromous species utilizing the Trinity River due to inadequate habitat conditions and water temperature.	Anticipated significant impacts to native anadromous salmonids in the Trinity River from implementation of this alternative would be unmitigatable.	Significant
Maximum Flow Flow Evaluation Percent Inflow	Violate temperature objectives and carryover storage criteria established in the Sacramento River winter run chinook salmon Biological Opinion.	(See mitigation for water quality related impacts under Water Quality.) ~~Consult with NMFS and implement any required conservation measures. Given the result of this consultation is unknown, this significant impacts is considered to be unmitigable at this time.~~ Significant impacts requiring mitigation for adverse effects to anadromous salmonids in the Sacramento River system associated with Maximum Flow and Percent Inflow Alternatives would need to be addressed during reconsultation with NMFS. Significant impacts related to temperature objectives and carryover storage criteria established in the Sacramento River winter-run chinook salmon BO for the Flow Evaluation (Preferred Alternative) were addressed through reconsultation under ESA with NMFS. Per the NMFS' Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize Southern Oregon/Northern California Coast (SONCC) coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, or Central Valley steelhead. The NMFS does anticipate that SONCC coho salmon habitat adjacent to and downstream of the channel rehabilitation projects associated with the Preferred Alternative may be temporarily degraded during construction. Construction of these projects, which will create a substantial amount of additional suitable habitat, may temporarily displace an unknown number of juvenile coho salmon but is not expected to result in a lethal take. The NMFS does not anticipate that the implementation of the proposed action will incidentally take Central Valley spring-run chinook or Central Valley steelhead, but that the Preferred Alternative will result in a minute increase in the level of Sacramento River winter-run chinook incidentally taken in all years except critically dry years. In such years, Reclamation would be required to reinitiate consultation per the	Significant[a]

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		existing Winter-run Central Valley Project Operations Criteria and Plan to develop year-specific temperature control plans. Implementation of the following reasonable and prudent measures specified in the NMFS BO to minimize the effects of incidental take shall be non-discretionary and will result in minimizing impacts of incidental take of SONCC coho salmon and Sacramento River winter-run chinook salmon in all years including critically dry years: The Service and Reclamation shall: 1. Implement the flow regimes included in the proposed action (as described in the DEIS/EIR, page 2-19, Table 2-5) as soon as possible. 2. Ensure that NMFS is provided the opportunity to be represented during implementation of the Adaptive Environmental Assessment and Management program. 3. Ensure that the replacement bridges and other infrastructure modifications, needed to fully implement the proposed flow schedule, are designed and completed as soon as possible. 4. Periodically coordinate with NMFS during the advanced development and scheduling of the habitat rehabilitation projects described in the DEIS/EIR. 5. Complete “the first phase of the channel rehabilitation projects” (U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, 2000) in a timely fashion. 6. Implement emergency consultation procedures during implementation of flood control or “safety of dams” releases from Lewiston Dam to the Trinity River. 7. In dry and critically dry water-year classes, Reclamation and Service shall work cooperatively with the upper Sacramento River Temperature Task Group to develop temperature control plans that provide for compliance with temperature objectives in both the Trinity and Sacramento Rivers. Implementation of these measures will be non-discretionary.	

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Resident Native and Non-native Fish			
State Permit	Increased water temperatures, which would reduce non-native Trinity River fish habitat.	Anticipated significant impacts to resident fish in the Trinity River from implementation of this alternative would be unmitigatable.	Significant
Maximum Flow Flow Evaluation Percent Inflow	Impacts to Delta smelt and Sacramento splittail as a result of changes in Delta inflow to export ratios.	~~Consult with Service and implement any required conservation measures. Given the result of this consultation is unknown, this significant impact is considered to be unmitigable at this time.~~ Significant impacts requiring mitigation related to changes in Delta inflow and export ratios associated with Maximum Flow and Percent Inflow Alternatives would need to be addressed during reconsultation with NMFS. Significant impacts related to changes in Delta inflow and export ratios for the Flow Evaluation (Preferred Alternative) were addressed through consultation under ESA with the Service. Per the Service's Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize delta smelt and Sacramento splittail or adversely modify critical habitat for delta smelt. The Service has concurred with the determination that implementing the Preferred Alternative will not likely adversely affect the bald eagle and northern spotted owl. It is anticipated that delta smelt and Sacramento splittail will be adversely affected by implementing the Preferred Alternative and that incidental take may be affected in manner or extent not analyzed in the March 6, 1995 Biological Opinion on the Long-term Operation of the CVP and SWP. Therefore, the following reasonable and prudent measure to minimize the effects of incidental take was developed: 1. U.S. Bureau of Reclamation (Reclamation) shall minimize the effects of reoperating the Central Valley Project resulting from the implementation of the Preferred Alternative within the Trinity River Basin on listed fish in the Delta. Implementation of this measure will be non-discretionary.	Significant[a]
Reservoirs			
Maximum Flow	Impacts to largemouth and smallmouth bass spawning in Trinity Reservoir due to reduced water surface levels.	A smallmouth and largemouth bass stocking program shall be instituted similar to the existing stocking program for coldwater species.	Less than significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Ocean Fisheries Economics			
State Permit	Reduced angler benefits and net income of charter boat operators in the Mendocino Region.	No mitigation is available.	N/A
State Permit	Reduced commercial fishing harvests and related economic benefits.	No mitigation is available.	N/A
	Tribal Trust		
State Permit	Reduced flows would lead to further decline in tribal access to trust resources.	No mitigation is available.	Significant
	Vegetation, Wildlife, and Wetlands		
Vegetation			
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Ground disturbing activities could result in a loss of vegetation and special-status plant populations.	Conduct site-specific environmental reviews prior to mechanical ground-disturbing activities. Such reviews shall, when appropriate, include surveys for federal and state endangered, threatened, and proposed species, or for other species if required by permitting agencies (e.g., USFS). If such species are present, actions shall be taken to avoid impacts. Develop and implement a revegetation plan for all ground-disturbing activities (excluding channel rehabilitation sites). Revegetation shall use plant species found adjacent to the impact area or from similar habitats, subject to land-owner and/or agency concurrence. Replacement ratios and monitoring plans, if determined necessary, will be developed in cooperation with the Corps, Service, and CDFG.	Less than significant
State Permit	Further degradation of riparian vegetation due to reduced flows.	No mitigation is available.	Significant
Wildlife			
Flow Evaluation Percent Inflow Mechanical Restoration	Direct mortality of foothill yellow-legged frogs or egg masses, adult western pond turtles and hatchlings, or willow flycatcher nests and young during construction (and maintenance for the Mechanical Restoration) of the channel rehabilitation sites.	Conduct site-specific environmental reviews prior to mechanical ground-disturbing activities. Such reviews shall, when appropriate, include surveys for federal and state endangered, threatened, and proposed species, or for other species if required by permitting agencies (e.g., USFS). If such species are present, actions shall be taken to avoid impacts (e.g., delay construction until after willow flycatcher chicks fledge).	Less than significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
State Permit	Continued degradation and reduction of habitat as a result of reduced flows.	No mitigation is available.	Significant
Wetlands			
Flow Evaluation Percent Inflow Mechanical Restoration	The mechanical channel rehabilitation projects could impact wetland resources.	Conduct pre-construction delineation of wetland areas at sites that may contain wetlands. Consult with the Corps on potential impacts to wetland resources. No mitigation is available.	Less than significant
		Recreation	
Riverine			
Maximum Flow Flow Evaluation Mechanical Restoration State Permit Percent Inflow	Impacts from flows to a number of recreation activities for at least a portion of the recreation season.	Flow-related significant impacts would be unmitigable without changing the flow release schedule which is inherent to the alternative.	Significant
Maximum Flow Flow Evaluation State Permit Percent Inflow	Impacts to public safety from river flows that are too high or too low (i.e., outside the preferred range for boating).	Post signs at river access points showing daily flows. Offer a toll-free telephone number so recreationalists can call to obtain daily flow information. Post daily flows on the Internet.	Less than significant
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Impacts to recreation activities from turbidity associated with the construction (and maintenance for Mechanical Restoration) of the channel rehabilitation sites.	(See mitigation for water quality related impacts under Water Quality.)	Less than significant
Reservoirs			
Maximum Flow Flow Evaluation	Increase the frequency at which Trinity Reservoir boat ramps are unusable, which would indirectly impact marinas and campgrounds.	All affected boat ramps should be extended a sufficient distance to accommodate the new water levels. Marina owners should be compensated for additional costs associated with moving their facilities or to construct new facilities to accommodate the new water levels. Campground facilities should be modified or funding provided to accommodate the revised operational approach.	Less than significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		Land Use	
Residential/Municipal and Industrial			
Maximum Flow Flow Evaluation Percent Inflow	Increased flooding of Trinity River structures and/or residences.	Property owners could be compensated at fair market value for all flood-related structure/improvement losses incurred, or funding would be provided to retrofit structures/improvements to withstand peak flows. Property owners who have parcels with buildable sites outside of the current 100-year floodplain that would be regularly inundated could be compensated at fair market value for the loss of development rights to that parcel. Given funding for these efforts is not yet been determined, this significant impact is considered to be unmitigable at this time.	Significant
Maximum Flow	Potentially significant M&I related impacts as a result of decreased surface-water supplies.	(See water supply related impacts under Groundwater.)	Significant
Agriculture			
Maximum Flow Flow Evaluation	Substantially decrease irrigated acreage within the San Felipe Unit.	(See water supply related impacts under Groundwater.)	Significant
		Power	
Maximum Flow Flow Evaluation Percent Inflow	Potentially significant power-related impacts from decreased surface-water supplies.	(See water supply related impacts under Groundwater.~~)~~ Power-related benefits associated with such programs would only occur if operations were conducted to provide increased generation; otherwise, implementation of such programs could negatively affect power resources.) Operating criteria would be established to allow Western to respond to various emergency situations in accordance with their obligations to the North American Electric Reliability Council. This commitment would also provide for exemptions to a given alternative's operating criteria during search and rescue situations, special studies and monitoring, dam and powerplant maintenance, and spinning reserves. Such exemptions for responding to various emergency situations would be consistent with the Presidential Memorandum, dated August 3, 2000, directing federal agencies to work with the State of California to develop procedures governing the use of backup power generation in power shortage emergencies.	Significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		Cultural Resources	
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Impacts to cultural resources.	Conduct cultural resource surveys of project areas (including areas of ancillary activities, such as staging areas, gravel mining areas, etc.) prior to ground disturbance. Areas containing cultural resources shall be demarcated and activities planned to avoid these areas. If cultural resources cannot be avoided, additional research or test excavations (as appropriate) will be undertaken to determine whether the resources meet CEQA and/or NRHP significance criteria. Unavoidable impacts on significant resources would be mitigated for in a manner that is deemed appropriate. Mitigation for significant resources may include, but is not limited to, data recovery, public interpretation, performance of a Historic American Building Survey or Historic American Engineering Record, or preservation by other means.	Less than significant
		Air Quality	
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Spawning gravel placement and other heavy equipment work associated with the alternatives would result in potentially significant PM_{10} impacts as a result of fugitive dust.	Implement a dust control program, which includes: watering of stockpiles, roads, etc. as necessary, and identify an individual to monitor dust control and to respond to citizen complaints.	Less than significant

[a]These impacts were identified as "significant" per the CEQA-related significance threshold standards described in Chapter 3.

2.2 Changes to the DEIS/EIR

1.0 Introduction and Purpose and Need *(SEE SUBSECTIONS)*
1.1 Introduction *(NO CHANGE)*
1.2 Purpose and Need for the Action *(SEE SUBSECTIONS)*
1.2.1 Purpose and Need Statement *(NO CHANGE)*

1.2.2 Goals and Objectives **(CHANGES FOLLOW)**
pg. 1-5

The following are project objectives for CEQA compliance that apply to state ***responsible*** and ***trustee agencies*** such as the North Coast Regional Water Quality Control Board (NCRWQCB), the State Lands Commission (SLC), the California Department of Fish and Game (CDFG) and (possibly) the State Water Resources Control Board (SWRCB):~~a~~

- Comply with the Water Code to ensure the highest reasonable quality of waters of the state, while allocating those waters to achieve the optimum balance of beneficial uses.
- Protect the public trust assets of the Trinity River watershed.
- Conserve, restore, and manage fish, wildlife, and native plant resources.
- Double populations of naturally produced salmon, steelhead, and anadromous fish in the waters of California, including the Trinity and Sacramento Rivers and the Delta, pursuant to the Fish and Game Code Section 6900-6924, the Salmon, Steelhead Trout, and Anadromous Fisheries Program Act.

Trinity River Restoration Program Goals.
pg. 1-7

In the future, quantitative population objectives for Trinity River salmonids may be established by the National Marine Fisheries Service (NMFS) as part of the recovery planning process under the Endangered Species Act (ESA). Currently, Trinity River naturally produced coho salmon are listed as threatened, and both the chinook and steelhead are candidates for listing.

1.3 General Setting and Location *(NO CHANGE)*
1.4 Legislative and Management History *(NO CHANGE)*
1.5 Indian Tribes *(NO CHANGE)*
1.6 Project Facilities *(SEE SUBSECTIONS)*
1.6.1 Trinity River Division *(NO CHANGE)*

1.6.2 Central Valley Project **(CHANGES FOLLOW)**
pg. 1-19

The CVP provides water for irrigation, municipal and industrial (M&I), hydropower, and fish and wildlife purposes in and outside of the Central Valley of California. The CVP supplies ***irrigation water*** to approximately 200 water districts, individuals, and companies pursuant to annual ~~contracts~~ demand for approximately 4.5 million acre-feet (maf) of ~~developed contract~~ water. These supplies are provided to entities with pre-1914 water rights, as well as through contracts to water service, water rights settlement, and exchange water contract

holders. M&I water is supplied to about 40 districts and utilities under contracts of about 0.5 maf. Except in times of water shortage, Reclamation operates the CVP to deliver the amounts of water specified in its water service contracts and other water rights agreements. Major structures of the CVP include 20 reservoirs, with combined storage capacity of 11 maf; 9 powerplants and 2 pumping-generating plants with a maximum capacity of about 2.0 million kW; and approximately 500 miles of major canals and aqueducts (see Figure 3-11 for a graphic depicting the major facilities in the CVP).

1.6.3 State Water Project *(NO CHANGE)*

1.7 Similarities and Differences between NEPA and CEQA (CHANGES FOLLOW) pg. 1-20

CEQA requires that this DEIS/EIR propose mitigation measures for each significant effect of the project subject to the approval of an agency governed by California law, even where the mitigation measure cannot be adopted by the "lead agency" (Trinity County for this project), but can only be imposed by another responsible agency. At present, it is unclear whether the SWRCB will function as a responsible agency. As the CEQA lead agency, however, Trinity County has decided that the EIR portion of the EIS/EIR must be sufficient for any future action taken by SWRCB, should it get involved in some fashion. For this reason, the DEIS/EIR must contemplate action by the SWRCB. Many of the proposed mitigation measures could ultimately ~~by~~ be within the jurisdiction of the SWRCB.

1.8 Scoping and Public Involvement (CHANGES FOLLOW) pg. 1-22

The Service began the public process by preparing an NOI to prepare an EIS, which was published in the Federal Register on October 12, 1994. Trinity County forwarded a Notice of Preparation (NOP) of an EIR to the State Clearinghouse (No. 94123009) on November 15, 1994. The new State Clearinghouse number is 1994123009.

1.9 Other Related Environmental Processes *(NO CHANGE)*
1.10 Preparers of the DEIS/EIR *(NO CHANGE)*
1.11 Areas of Controversy *(NO CHANGE)*

2.0 Description of Alternatives *(SEE SUBSECTIONS)*
2.1 Alternatives *(SEE SUBSECTIONS)*

2.1.1 Selection of the Preferred Alternative (CHANGES FOLLOW) pg. 2-3

The Flow Evaluation Alternative, coupled with additional watershed protection efforts (described in the Mechanical Restoration Alternative), was identified as the Preferred Alternative in terms of best meeting the purpose and need and goals and objectives, while also minimizing adverse impacts. The selection of the Preferred Alternative also utilized the following screening criteria, which were jointly developed by the four co-leads (Service, Reclamation, Hoopa Valley Tribe, and Trinity County). The Preferred Alternative:

- Substantially increases natural production of anadromous fish on the Trinity River mainstem
- Substantially restores inriver and ocean fishing opportunities

- Improves tribal access to trust resources
- Balances environmental and social beneficial and adverse impacts across the Trinity River Basin, Lower Klamath River Basin/Coastal Area, and Central Valley Basin while meeting the mandate from the SWRCB in Water Rights Orders 90-05 and 90-01 to cause no harm to the Trinity River fishery as a result of diversions to the Sacramento River for temperature control
- Allows for the continued operation of the TRD, including water exports
- Limits flooding impacts on the Trinity River

pg. 2-4

The following text has been added immediately above 2.1.2 No Action Alternative:

The 600 thousand acre-feet (taf) carryover storage level associated with the Flow Evaluation Alternative would be maintained for the Preferred Alternative except in exceedingly dry years if deemed necessary to avoid potentially infeasible operations at Shasta Dam. In such years (identified as potentially occurring in the future per the modeling analysis under the cumulative scenario), carryover storage would be reduced to 400 taf.

2.1.2 No Action Alternative (CHANGES FOLLOW)

The No Action Alternative represents ongoing activities and operations and is intended to meet the state CEQA Guidelines, §15126, as "a condition that would be reasonably expected to occur if the project were not approved." Components of this alternative are approved programs that have obtained all environmental clearances and permits. The No Action Alternative reflects conditions in the year 2020 and includes projections concerning future growth and land use changes per the DWR Water Plan Update (Bulletin 160-93). The year 2020 was identified as the planning horizon because of the inter-relationship with the DWR Bulletin 160-93, data from the Trinity County General Plan, and the Central Valley DPEIS. The No Action Alternative includes assumptions concerning concurrent but separate issues, such as the assumption that ocean harvest limitations for sport and commercial salmon fishing would be consistent with ~~1992~~ policies that have been in place since 1992 and would be evaluated in a separate process by NMFS and other groups. The No Action Alternative does not assume implementation of any of the provisions or programs of the CVPIA, and is therefore identical to the No Action Alternative in the CVPIA Programmatic Environmental Impact Statement (PEIS) process.

pgs. 2-5 and 2-6

Table 2-2 has been modified. The reference to the CVPIA under Trinity River has been deleted. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 2-2.

Water Operations.
pg. 2-7

The following text has been added immediately above Watershed Protection:

Subsequent to the modeling analyses conducted for the Draft EIS/EIR, the California Court of Appeal for the Third Appellate Court struck down a portion of the Monterey Agreement signed by the Department of Water Resources and State Water Project (SWP) contractors in 1994. The agreement amendments changed the prior method of allocating water supply deficiencies, which reduced supplies to agricultural contractors before those to urban contractors were cut. The No Action and all other Trinity alternatives assume the Monterey Agreement is in place, and SWP supplies are allocated among agricultural and municipal and industrial (M&I) contractors evenly in proportion to their entitlement. The Monterey Agreement, as simulated in the No Action Alternative, has no effect on the level of SWP delivery, rather it only affects the delivery allocation to contractors south of the Delta once an overall delivery level has been determined. Therefore, the Monterey Agreement does not have any impact on the amount of water the SWP exports from the Delta. The amount of water exported is a function of demand, available supply, and export restrictions.

Accordingly, it is not anticipated that this court decision will have any significant impact on the results of the modeling analyses conducted for the Draft EIS/EIR.

pgs. 2-8 and 2-11

Fish Population Management. Fishing would continue under current harvest plans approved by the Klamath Fishery Management Council (KFMC)~~, and the~~ PFMC, Hoopa Valley Tribe, Yurok Tribe, and California Fish and Game Commission. Fisheries that do not have comprehensive management plans would continue to be managed by the responsible agencies or tribes. The TRSSH would continue to produce fish at current levels, as shown in Table 2-3.

2.1.3 Maximum Flow Alternative **(CHANGES FOLLOW)**
pg. 2-12

Table 2-4 has been modified to correct a unit error. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 2-4.

2.1.4 Flow Evaluation **(CHANGES FOLLOW)**
pgs. 2-16 and 2-17

~~As described in the TRFES, t~~The ~~a~~Adaptive Environmental Assessment and ~~m~~Management (AEAM) program would be administered by an executive director hired by the Trinity Management Council, the decision-making group within the AEAM program ~~appointed by the Secretary~~. ~~The director would oversee a Trinity management council composed of fishery agency representatives.~~ The ~~c~~Council would serve as a policy group that reviews, modifies, accepts, or remands recommendations made by a technical modeling and analysis team. Also included in the process would be a scientific advisory board, a stakeholder~~'s~~ group, a regulatory agency group, a contracting and environmental compliance group, an ~~and~~ external peer review~~ers.~~ group, and a liaison to the Secretary of the Interior. The AEAM ~~adaptive management~~ program would typically convene ~~in the winter~~ several times during the year to make decisions concerning the coming year's dam releases, budgeting

activities, and other management actions. A detailed description of the adaptive management program was given in the Trinity River Flow Evaluation Study, pages 278 through 289. Appendix F of the Trinity River Mainstem Fishery Restoration FEIS/EIR further refines the structure of the AEAM program. ~~(for a complete description of the adaptive management program see U.S. Fish and Wildlife Service and Hoopa Valley Tribe, 1999).~~

The adaptive management program could result in minor modifications to the Flow Evaluation hydrographs described in this DEIS/EIR. ~~Any m~~Modifications to the proposed restoration activities (flow schedules and channel rehabilitation projects) resulting from the AEAM ~~adaptive management~~ program ~~would~~ could be subject to additional NEPA and CEQA analysis as required by law. All mechanical ground-disturbing actions originating from the adaptive management program, regardless of whether they are described in this document, would be subject to site-specific environmental review.

pg. 2-17

Table 2-5 has been modified to correct a unit error and number of acre-feet under the normal water-year class. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 2-5.

Water Management.
pg. 2-18

Fluvial geomorphic/salmonid smolt temperature control flows (late April/mid-May through June 30)—These were developed to provide fluvial geomorphic processes and suitable temperature and flow conditions for outmigrating salmonid smolts. Peak flows of 11,000 cfs would be released for 5 days beginning May 24 during extremely wet water years to assist in geomorphic processes such as mobilizing sediment, scouring the riverbed, reshaping the channel, and removing encroaching vegetation. These higher magnitude flows are geomorphically more efficient (more sediment transport per unit of water, greater depth of scour, etc.) than lower flows, and the magnitude of 11,000-cfs flows was found to cause scour depths on exposed point bars sufficient to scour away 2- to 3-year-old willow seedlings, which is a critical process to prevent future riparian encroachment and habitat simplification. The peak levels would vary for each water-year class, down to a minimum of 1,500 cfs in critically dry years. During such years, these flows would not be sufficient to recontour the channel, but would help prevent the germination of unwanted vegetation.

pg. 2-21

Fish Habitat Management. Forty-seven mechanical rehabilitation projects would be constructed because the flow schedule associated with this alternative is too low to remove the existing riparian berms along the river. Figure 2-4 shows the location of each proposed rehabilitation site as well as existing sites. Once portions of the berms are mechanically removed, high flows and gravel transport would naturally create and maintain dynamic alluvial features and floodplain riparian communities. Consequently, no mechanical maintenance would be planned for the proposed or existing channel rehabilitation projects.

The proposed mechanical rehabilitation projects would involve the following:

- A total of 47 mechanical rehabilitation projects would be constructed between the Lewiston Dam and the confluence with the North Fork Trinity River. The sites would encompass approximately 665 acres. Construction would be scheduled between July 15 and September 15 to minimize impacts to fall chinook, coho, and steelhead.
- Of these 47 mechanical rehabilitation projects, 44 would be channel rehabilitation projects, and the remaining three would be side-channel projects. Twenty-four of the channel projects would be built in the first 3 years, with the remainder to be completed contingent upon an evaluation by the adaptive management program. A typical mainstem rehabilitation project would be approximately 150 feet wide (measured from the water's edge) and 500-5,000 feet long. A typical side-channel improvement would be 80 feet wide and 800 feet long.
- A typical project would take 6 weeks to construct and would require the use of front-end loaders, bulldozers, screens, and trucks.
- Each bank rehabilitation project will remove the confining riparian berms, remove the large volumes of sand stored within the berms from frequently flooded areas, reconstruct functional floodplains that are frequently inundated by the proposed high flow regime, and revegetate portions of the newly constructed floodplains with native woody riparian vegetation that increases overall riparian structure, cover, and diversity within the Trinity River corridor.
- Several bank rehabilitation projects may include reclaiming historic gravel mining pits and gold dredger tailings into off-channel riparian and aquatic wetlands.

Figure 2-4 has been revised to more clearly indicate the location of potential side channels. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 2-4.

2.1.5 Percent Inflow Alternative (CHANGES FOLLOW)
pg. 2-25

Table 2-6 has been modified to correct a unit error. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 2-6.

2.1.6 Mechanical Restoration Alternative *(NO CHANGE)*
2.1.7 State Permit Alternative *(NO CHANGE)*
2.2 Alternatives Considered but Eliminated *(SEE SUBSECTIONS)*
2.2.1 Remove Trinity and Lewiston Dams *(NO CHANGE)*
2.2.2 Harvest Management *(NO CHANGE)*
2.2.3 Fish Passage Facilities *(NO CHANGE)*
2.2.4 Truck Fish around the Dams *(NO CHANGE)*
2.2.5 Predator Control *(NO CHANGE)*
2.2.6 Increase Hatchery Production *(NO CHANGE)*
2.2.7 Pumped Storage Project *(NO CHANGE)*
2.2.8 Channel Augmentation Using Weaver Creek *(NO CHANGE)*

pg. 2-45

A note has been added to Figure 2-8 to more clearly explain the figure's content. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 2-8.

pg. 2-47

Table 2-9 has been modified to correct the number of acre-feet under the normal water-year class. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 2-9.

3.0 Affected Environment and Environmental Consequences *(SEE SUBSECTIONS)*
3.1 Introduction *(SEE SUBSECTIONS)*

3.1.1 Trinity River Basin **(CHANGES FOLLOW)**
pg. 3-6

The Hoopa Valley Indian Reservation is located north of Willow Creek along the Trinity River and State Highway 96. The reservation is approximately ~~14~~ 144 square miles, with the northern border lying near Weitchpec at the confluence with the Klamath River.

3.1.2 Lower Klamath River Basin/Coastal Area *(NO CHANGE)*
3.1.3 Central Valley *(NO CHANGE)*
3.2 Geomorphic Environment *(SEE SUBSECTIONS)*

3.2.1 Channel Geomorphology and Fluvial Processes **(CHANGES FOLLOW)**
pg. 3-17

A note has been added to Figure 3-5 to compare Figure 3-5 to Figure 3-7. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 3-5.

pg. 3-23

A note has been added to Figure 3-7 to compare Figure 3-7 to Figure 3-5. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 3-7.

3.2.2 Attributes of a Healthy Alluvial River **(CHANGES FOLLOW)**
pg. 31

Figure 3-8 has been revised to more accurately identify alluvial river characteristics. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 3-8.

3.3 Water Resources *(SEE SUBSECTIONS)*

3.3.1 Surface-water Hydrology and Management **(CHANGES FOLLOW)**

Environmental Consequences.

<u>Methodology</u>.
pg. 3-62

The No Action Alternative is used as the baseline for comparison of alternatives. No Action and the other alternatives reflect future conditions at the year 2020 level of development. These future conditions are based on projections concerning future growth, land use changes, and changes in CVP operational policies that are being considered and are under-

going separate environmental documentation. The hydrology and demands included in these simulations reflect DWR Bulletin 160-93. At the year 2020 level of development, ~~annual~~ CVP contracts are assumed to total 6.5 maf per year (with annual demands ranging from 6.2-6.5 maf), and ~~annual~~ SWP entitlements assumed to total 4.2 maf per year (with annual demands ranging from 3.4-4.2 maf). The greatest increases in CVP demands are assumed to occur north of the Delta in association with M&I water rights and water service contracts with the CVP's American River Division (approximately a 320,000 af increase in annual demand).

The following text has been added immediately following the third paragraph on page 3-62:

Subsequent to the modeling analyses conducted for the Draft EIS/EIR, the California Court of Appeal for the Third Appellate District struck down a portion of the Monterey Agreement signed by the Department of Water Resources and SWP contractors in 1994. The agreement amendments changed the prior method of allocating water supply deficiencies, which reduced supplies to agricultural contractors before those to urban contractors were cut. The No Action and all other Trinity alternatives assume the Monterey Agreement is in place, and SWP supplies are allocated among agricultural and M&I contractors evenly in proportion to their entitlement. The Monterey Agreement, as simulated in the No Action Alternative, has no effect on the level of SWP delivery, rather it only affects the delivery allocation to contractors south of the Delta once an overall delivery level has been determined. Therefore, the Monterey Agreement does not have any impact on the amount of water the SWP exports from the Delta. The amount of water exported is a function of demand, available supply, and export restrictions.

Accordingly, it is not anticipated that this court decision will have any significant impact on the results of the modeling analyses conducted for the Draft EIS/EIR.

pg. 3-63

~~There are no major water management issues downstream of the confluence of the Klamath and Trinity Rivers.~~ As noted previously, the influence of tributaries downstream of the North Fork reduces the effects of changes in Lewiston releases. Accordingly, impacts to the Lower Klamath River Basin/Coastal Area are not discussed. Impacts related to flooding are addressed in Residential/Municipal and Industrial (Section 3.9.1).

pg. 3-64

Table 3-3 has been modified to more accurately represent Trinity Reservoir elevations. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-3.

pg. 3-79

The DEIS/EIR header incorrectly labeled pages 3-79 through 3-124 as "3.4 Water Resources." This numbering problem has been corrected. The header on pages 3-79 through 3-124 now reads: "3.3 Water Resources."

Flow Evaluation.
pg. 3-80

Shasta Reservoir storage would be only slightly impacted due to reduced TRD exports in the long-term average, while dry period effects would be more substantial. In this alternative, long-term average end-of-water-year storage is only slightly less than the No Action Alternative (60,000 af decrease, or 2 percent), while dry-period levels drop 130,000 af (8 percent). The Biological Opinion end-of-water year minimum storage criterion of 1.9 maf is met with the same frequency as under No Action (12 percent for both alternatives). ~~However, during the dry period, minimum storage levels drop approximately 350,000 af below the No Action level.~~

Long-term average annual CVP deliveries decrease by 90,000 af (2 percent). Reductions during the dry period average 160,000 af (4 percent). Annual Delta exports through the Tracy Pumping Plant are reduced by 60,000 af (2 percent) over the entire long-term period and 90,000 af (~~4~~ 5percent) during the dry period. Annual Delta inflow would decrease by 220,000 af (1 percent) over the long-term period and 90,000 af (1 percent) during the dry period. Average annual Delta outflow would decrease by 150,000 af (1 percent) over the long-term period, but would be similar to no Action for the dry period.

pg. 3-81

State Permit. Compared to the No Action Alternative, this alternative would increase long-term average annual exports to the Central Valley by ~~200,000~~ 210,000 af (23 percent) and dry-period exports by 210,000 af (~~41~~ 39 percent). Under this alternative, the prescribed minimum storage in Trinity Reservoir would be the same as the No Action Alternative (400,000 af). Average end-of-water-year storage in Trinity Reservoir would increase during the dry period by 40,000 af (~~4~~ 5 percent) and over the long-term by 80,000 af (6 percent).

pg. 3-82

Existing Conditions versus Preferred Alternative. A large portion of the change in water impacts between 1995 existing conditions and the year 2020 under the Preferred Alternative is attributed to growth and development. In other words, existing conditions assumes a 1995 level of social and economic development, whereas the Preferred Alternative assumes a 2020 level of development (as do the other alternatives). For example, between 1995 and 2020, annual M&I water service contracts and water rights demands are assumed to increase 320,000 af north of the Delta, due primarily to increased M&I demand in the CVP American River Division (major contractors within this division include the City of Sacramento and Placer County). Similarly, agricultural water service contracts and water rights demands north of the Delta are expected to increase 40,000 af over the long-term average. (CVP ~~demands~~ contract amounts south of the Delta in the year 2020 are anticipated to remain comparable to 1995 levels.)

pg. 3-83

Shasta Reservoir end-of-water-year storage would be less than existing conditions by 100,000 af (4 percent). This reduction is attributable to decreased TRD exports as well as increased demand levels in 2020. The Biological Opinion storage threshold of 1.9 maf would be met less frequently than in existing conditions (12 percent of years compared

to ~~10~~ 9 percent). The reduced frequency of meeting the threshold is attributable to non-project changes between 1995 and 2020. During the dry period, minimum storage levels under the Preferred Alternative drop more than 500,000 af below existing condition levels.

3.3.2 Groundwater (CHANGES FOLLOW)

Affected Environment.
pg. 3-85

The following new text has been added to Affected Environment as the third paragraph on page 3-85 immediately following Lower Klamath River Basin/Coastal Area:

<u>Santa Clara and San Benito Counties</u>. Imported surface water from the CVP San Felipe Unit is provided to areas in Santa Clara and San Benito Counties. Water conveyed to these areas is intended to supplement available supplies, minimize groundwater mining, stabilize groundwater level, arrest land subsidence, and improve water quality conditions.

Three interconnected groundwater basins are located within the Santa Clara County area: Santa Clara Valley Basin, Coyote Basin, and Llagas Basin (U.S. Bureau of Reclamation, 1976b). Extensive groundwater pumping for agricultural purposes produces overdraft conditions in these groundwater basins, and resulted in land subsidence, increased pumping costs, and seawater intrusion from the San Francisco Bay. To reverse these conditions, surface water was initially imported to the area in the 1960s through the SWP South Bay Aqueduct. Continued growth during the late 1960s and 1970s threatened to return the area to overdraft conditions. These concerns were dampened by additional surface-water imports to the area from the San Felipe Unit of the CVP in the 1980s. Much of this imported water is distributed to percolation ponds for groundwater recharge, and the remainder is further distributed for direct use and storage.

Groundwater resources in the San Benito County (Hollister area) consist of numerous subbasins partially separated by barriers, generally fault zones, that criss-cross the area. Irrigation of agricultural lands in this area has relied on groundwater as the primary supply. As historical agricultural development expanded, groundwater withdrawals began to exceed groundwater recharge, causing severe declines in groundwater levels. In the 1980s, surface water was imported to this area from the San Felipe Unit of the CVP for the purposes of alleviating the degenerating groundwater conditions. Because of the complex geological fault system, direct groundwater recharge is limited, and imported water is distributed primarily for direct use and storage.

<u>*Central Valley*</u>.

~~Prior to development of the CVP, g~~***Groundwater overdraft*** conditions have occurred in portions of the San Joaquin Valley and Tulare Basin as a result of extensive groundwater development and the reliance on groundwater during drought years. In some areas, regional groundwater elevations declined by more than 300 feet during the 1940s and 1950s. The development of surface-water supplies in the 1950s and 1960s reduced reliance on groundwater, thus lessening overdraft conditions, and helped control the rapid rate of groundwater-level decline. However, the long-term effects of continued groundwater use have resulted in regional land subsidence. The largest example of human-induced land subsidence in the world occurs in the San Joaquin Valley. Approximately 5,200 square miles

have experienced land subsidence of more than 1 foot. The maximum subsidence of 29.6 feet, recorded between 1925 and 1977, is within western Fresno County (U.S. Geological Survey, 1991). The geographic extent of land subsidence generally coincides with areas where groundwater elevations have declined significantly as a result of historical overdraft conditions (Figure 3-21).

Sacramento Valley.
pg. 3-86

Surface-water and groundwater resources in this region are interdependent. A majority of streambeds in the Sacramento Valley are hydraulically connected with the underlying aquifer. Many streams in this region have historically been gaining streams, a condition where groundwater is discharged into the stream. ~~Only when the aquifer water level falls below the elevation of the streambed would the system be considered hydraulically disconnected.~~ When aquifer water levels fall below the elevation of the streambed, the stream changes from a gaining to a losing stream. Some stream reaches south of the Sutter Buttes have changed to losing streams as groundwater levels have declined due to groundwater pumping.

San Joaquin Valley.
pg. 3-89

The Corcoran Clay Member that divides the groundwater system into two major aquifers underlies much of the western portion of this region. ~~Aquifer recharge to the semi-confined upper aquifer historically occurs from stream seepage, deep ***percolation*** of rainfall, and subsurface inflow along the basin boundary.~~ Post-development aquifer recharge to the semi-confined upper aquifer historically occurs mostly from deep ***percolation*** of irrigation water, but also from deep percolation of rainfall, stream seepage, and subsurface inflow along the basin boundaries. The lower confined aquifer is recharged from subsurface inflow coming from the east boundary of the Corcoran Clay Member. Annual groundwater pumping in the San Joaquin Valley exceeds recent estimates of perennial yield by 200,000 af. Prior to the mid 1950s, ~~the interaction of groundwater and surface water in the San Joaquin Valley resulted in net gains to the streams. Under more recent conditions however, a net loss from streams to the groundwater system has become the predominant condition, a result of groundwater declines from increased pumping~~ the southern portion of the San Joaquin Valley in Madera County experienced net losses from streams, while the northern portion of the San Joaquin Valley generally experienced gains from streams. This situation has not changed. Currently, portions of the San Joaquin Valley continue to experience net gains from streams, while the Madera County portions of the Valley experience losses from streams. Depth to groundwater is approximately 50-100 feet.

Tulare Basin.
pg. 3-90

A significant limitation on groundwater use in municipalities within the Tulare Basin has been caused by the presence of toxins such as dibromochloropropane (DBCP) and ethylene dibromide (EDB) which exceed drinking water standards. DBCP levels resulting from historical agricultural use exceed the maximum standard in large areas of eastern Fresno County and Tulare County and limit groundwater use in Fresno and other urban areas. EDB contamination, also resulting from historical agricultural use, limits groundwater use

in many areas of Kern County. In addition to DBCP and EDB, several other toxic compounds limit the use of water for municipal purposes in parts of the Tulare Basin.

Environmental Consequences.
pgs. 3-90 and 3-93

Methodology. ~~The groundwater analysis assumed groundwater pumping would increase to replace reductions in CVP or SWP deliveries.~~ The groundwater analysis assumes groundwater pumping would increase to replace reductions in CVP or SWP deliveries, with no change in land use or water application rate. It therefore estimates the largest impact on groundwater pumping for a given change in surface-water delivery and provides a very conservative, worst-case result. The agricultural analysis, described in Section 3.9.2, estimates the least costly combination of groundwater pumping, land fallowing, crop changes, and irrigation efficiency changes. Groundwater conditions were simulated using the Central Valley Groundwater-Surface Water Simulation Model (CVGSM), a monthly planning model developed by Reclamation, DWR, and the SWRCB for the Central Valley regional aquifer system. The CVGSM delineates the Central Valley into 21 subregions and hydrologic and water service boundaries (see Figure 3-22). The CVGSM model is a monthly groundwater planning tool that can be used to evaluate the groundwater conditions of the Central Valley regional aquifer under different management scenarios. For the Trinity hydrologic modeling efforts (includes surface-water and groundwater modeling) a static land use approach was taken. For static model runs the projected land use conditions are fixed over time. Two projected land use conditions were used as the basis for these static conditions: (1) a 1995 projected level and (2) a 2020 projected level. These projected-level conditions are the driving force behind the development of much of the projected-level data and assumptions required for the use of CVGSM for Trinity hydrologic modeling.

pg. 3-94

The following text has been added to Methodology on page 3-94 as a new paragraph immediately before Significance Criteria:

Groundwater resources in Santa Clara and San Benito Counties are managed through local groundwater regulations to minimize groundwater overdraft, land subsidence, and groundwater quality degradation. This groundwater management task is facilitated by CVP project water imports via the San Felipe Unit. It is assumed that these management practices will remain in place and that groundwater regulations will limit the potential for groundwater pumping. Because of these actions, no significant impacts to groundwater resources are anticipated and, therefore, are not analyzed under environmental consequences. However, possible reductions in CVP deliveries to the San Felipe Unit are projected to result in other impacts related to land use. These potential impacts are discussed elsewhere in the document (see Sections 3.9 Land Use, 3.11 Socioeconomics, and 4.1 Cumulative Impacts).

San Joaquin Valley and Tulare Basin.
pg. 3-96

Historically, groundwater supplies have been augmented with surface water imported through the San Luis Canal and Friant-Kern Canal. Although this would continue under the No Action Alternative, pumping would still occur at a rate in excess of groundwater replenishment. It is assumed that additional land subsidence, ranging from 1-5 feet over a

69-year simulation period, would occur in areas along the west side of the San Joaquin Valley as a result of continued increases in groundwater extractions required to compensate for ~~possible~~ modeled reductions in SWP and CVP supplies.

pg. 3-109

Existing Conditions versus Preferred Alternative. The comparison of the Preferred Alternative (i.e., Flow Evaluation) to 1995 existing conditions to without-project conditions in 2020 (i.e., No Action) indicates that most impacts to groundwater elevations between 1995 and 2020 would be attributed to growth and development ~~changes unrelated to the project~~. For example, the largest declines in groundwater elevations are seen in the urban areas of Sacramento and Fresno~~, the result of population growth~~ (Figure 3-31). There would be some reduction in surface-water supply attributed to the Preferred Alternative (see pages 3-82 through 3-84 for additional discussion). These reductions occur in CVP service areas along the west sides of the Tulare Basin, resulting in impacts to groundwater levels. These impacts are discussed further below. ~~Impacts as a result of the Preferred Alternative are not as great (Figure 3-26).~~

3.4 Water Quality **(CHANGES FOLLOW)**

Affected Environment.

Trinity River Basin.
pg. 3-126

The following text has been added immediately above Lower Klamath River Basin/Coastal Area:

On May 17, 1996, the EPA granted program authorization to the Hoopa Valley Tribe with respect to Section 303 of the CWA. Since that time, the Hoopa Valley Tribe has pursued development of a Water Quality Control Plan (Hoopa Valley WQCP) through the Hoopa EPA. An important component of the Hoopa Valley WQCP is water temperature criteria for waters within the Reservation, which includes part of the mainstem Trinity River, as well as several tributaries to the river. The temperature criteria presented in Table 3-5A were adopted by the Hoopa Valley Tribal Council (HVTC) on June 8, 2000; but at the time this document was prepared, the criteria remain to be approved by EPA. Water temperature in this Hoopa Valley WQCP is measured near the confluence of the Trinity River at Weitchpec.

See Section 2.3 Changes to the DEIS/EIR Tables and Figures for new Table 3-5A.

Environmental Consequences.
pg. 3-135

For each alternative, simulations of the RTM and BETTER models were performed for five specific years (1983, 1986, 1989, 1990, and 1977) representing five different water-year classes (extremely wet, wet, normal, dry, and critically dry). ~~Lewiston Dam release temperatures predicted from the BETTER model were subsequently modeled in the SNTEMP model under projected cold-wet, median, and hot-dry hydrometeorological conditions. Model results identified the percentage of time that NCRWQCB temperature objectives would be met. Table 3-7 presents the combinations of flows and temperatures necessary to meet temperature objectives under median weather conditions. Table 3-8 presents the modeling~~

~~results for each alternative under median conditions. Cold-wet and hot-dry conditions are presented in the Water Resources/Water Quality Technical Appendix A.~~ The water temperature standards developed for the Hoopa Valley WQCP were designed to conform with the flow regime specified by the TRFES, which is the basis of the Preferred Alternative of this EIS/EIR, and explicitly rejects the notion that additional flows would be required to satisfy temperature objectives beyond those described in the TRFES:

> "The Hoopa Valley Tribe's temperature objectives agree precisely with those outlined in the TRFE preferred alternative and are consistent with temperature objectives as specified in the NCRWQCB temperature standards for the Trinity River below Lewiston Dam and downstream to Douglas City and the confluence of the North Fork Trinity. *The Tribe's temperature objectives do not require additional flows over and above those required by TRFE"* (Hoopa Valley Tribe, 2000, emphasis added).

It is an established regulatory practice to forego enforcement of water temperature standards during periods of unusually warm ambient air temperature. The Hoopa Valley WQCP follows this practice and explicitly exempts the regulatory entities from responsibility for providing additional cool water to meet temperature objectives in such circumstances:

> "If temperature standards cannot be met due to unusually excessive ambient air temperatures coupled with TRFE level flows, enforcement action will not be pursued against USBR. Excessive air temperature will be determined if the measured 7-day average air temperature during the previous seven-day period of the year exceeds the 90th percentile of the 7-day average daily maximum air temperature calculated in a June 16th through September 14th series over the historic record available with the basin" (Hoopa Valley Tribe, 2000).

The Hoopa Valley Tribe also expressed that they would engage in the biennial review required by the CWA, and would seek to ensure that the water temperature standards are consistent with the TRFES, particularly as it may be modified through the Adaptive Environmental Assessment and Management (AEAM) process. As stated in the Tribe~~s~~ temperature standards:

> "The Tribe also recognizes that the development and implementation of control technologies and best management practices to reduce human caused warming are ongoing and the achievement of the optimal temperature standard will be an evolutionary process. The Hoopa Tribe will initiate Clean Water Act biennial review amendments, which are consistent with the Adaptive Environmental Assessment and Management (AEAM) principles, outlined in the TRFE as appropriate" (Hoopa Valley Tribe, 2000).

Each alternative was evaluated for its ability to meet the water temperature objectives of the NCRWQCB Plan. Implicit in this evaluation was the inclusion of upstream water temperature conditions that result from different water operations (i.e., withdrawal zone and diversions) of alternatives. The BETTER model, a two-dimensional water temperature model of Lewiston Reservoir, was used to predict Lewiston Dam-release water temperatures. The SNTEMP model subsequently used each alternative's flow schedule and predicted dam-release water temperatures to determine the percentage of time the objectives would be met.

Hydrometeorological conditions used for the evaluations of inriver effects of each alternative were evaluated with cold-wet, median, and hot-dry hydrometeorological conditions. Table 3-7 presents the combinations of flows and release water temperatures necessary to meet temperature objectives under median weather conditions. Table 3-8 presents modeling results for each alternative under median conditions. Cold-wet and hot-dry conditions are presented in the Water Resources/Water Quality Technical Appendix A.

Each alternative was also evaluated for its ability to meet the water temperature objectives of the Hoopa Valley Tribe's WQCP (Hoopa Valley Tribe, 2000). This evaluation relied upon model-predicted dam-release water temperatures from the BETTER model, as well as hydrometeorological conditions of representative years modeled by BETTER. These years included 1977 (critically dry), 1990 (dry), 1989 (normal), 1986 (wet), and 1983 (extremely wet). This evaluation provided estimates of the percentage of time the objectives would be met. These results are provided in Table 3-8A. Additional details of this evaluation are provided in the Water Resources/Water Quality Technical Appendix A.

Each alternative's effect on turbidity, sediment, and water quality of the lower Klamath River were analyzed qualitatively. An evaluation of the flow schedules of the Preferred Alternative (U.S. Fish and Wildlife Service and Hoopa Valley Tribe, 1999) provided information to provide qualitative assessments of the likely effects of alternative flows on water quality in the lower Klamath River. Flow alternatives were assessed for their ability to provide temperatures beneficial to salmonids in the Klamath River and their ability to provide dilution for potentially polluted Klamath River water.

See Section 2.3 Changes to the DEIS/EIR Tables and Figures for new Table 3-8A.

pg. 3-141

<u>Significance Criteria</u>. The following impacts were considered significant for both the Trinity Basin and the Central Valley:

- Substantial degradation of water quality, such that existing beneficial uses are precluded specifically due to adverse water quality.
- Violate any water quality standards or waste discharge requirements.
- Substantial alterations of the course of a stream or river in a manner that would result in substantial erosion or siltation on- or off-site.
- Short- or long-term increases in turbidity of 20 percent or more over naturally occurring background levels.
- Contamination of a public water supply.
- Variation in instream temperatures so as to adversely impact state or federally listed aquatic species (see the Fishery Resources section [3.5]). This is defined as an increase in the number of months with modeled temperatures exceeding the 1993 Winter-run Biological Opinion by more than ~~0.5°F, or a change in carryover storage at Shasta Reservoir compared to No Action. Notably, the use of a 0.5°F change in temperature as a significant impact represents a very conservative approach, in that the~~ any modeled temperature greater than the 56°F threshold criterion (or 60°F depending on date), or a

change in carryover storage at Shasta Reservoir compared to No Action. Notably, the use of no change in temperature greater than the threshold criterion of 56°F (or 60°F) as a significant impact represents a very conservative approach, in that the Central Valley Regional Water Quality Control Board normally considers a temperature change to be significant if a 1.0 degree change occurs.

- Degradation of water quality for a water quality constituent in a waterbody listed as impaired (e.g., under California's Clean Water Act 303(d) list).
- Increases in Delta water quality concentrations for EC, bromide, and DOC of greater than 5 percent, based on the accuracy of analytical methods.

<u>No Action</u>. Exports to the Central Valley would be similar to current operations and would generally maintain current temperatures in the Trinity River (Table 3-8). Modeled violations of Hoopa Valley Tribe water standards ranged from zero violations in the modeled extremely wet year (100 percent compliance) to 31 percent violations in the modeled normal year (69 percent compliance). This is reflective of the two-tiered nature of Hoopa EPA standards, with extremely wet, wet, and normal years being subject to one set of temperature standards, and the dry and critically dry years subject to a different set of standards. Compliance improves in the dry and critically dry water years because the standards are relaxed. Temperature compliance for Hoopa EPA standards is presented in Table 3-8A. Under the No Action Alternative, Sacramento River temperature objectives established in the Biological Opinion would not be met in some months (Table 3-8). These months are distributed across wet to dry hydrology due to the variable nature of the standards depending on water-year class. Carryover violations at Shasta Reservoir would occur in 12 percent of the years (Table 3-9). Existing Trinity River channel rehabilitation projects would be maintained, resulting in occasional, short-term increases in turbidity. Because this alternative does not provide dam releases sufficient in magnitude or duration to emulate pre-TRD flow patterns during the spring and early summer, except possibly in critically dry years, there would be times when water temperatures would be warmer than the Klamath River. Minimum Bay-Delta water quality standards are assumed to be met on a monthly basis.

pg. 3-142

Table 3-9 has been modified to more accurately reflect percent of Sacramento River violations under No Action. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-9.

<u>Maximum Flow</u>.

<u>Trinity River Basin</u>. The elimination of TRD exports resulted in additional modeled Trinity River temperature violations of NCRWQCB temperature standards in all five water-year classes, compared to No Action levels. The increased frequency of violations reflects the slower rate at which water moves through Lewiston Reservoir (i.e., lack of diversions to the Central Valley), and the associated warming effect (due to the reservoir's relatively shallow depth). The resultant Trinity River temperature impact would be significant. Alternately, this alternative would achieve better compliance with Hoopa EPA temperature standards than No Action in four of the five water-year classes. Maximum Flow would have increased frequency of violations with Hoopa EPA standards in the extremely wet water year. Violations occur because of a combination of higher Lewiston release temperatures and lower

flows. The relatively high flows scheduled in May in the Maximum Flow Alternative preclude the need for spills later in the year, as are needed under the No Action Alternative. Increased violations of Hoopa EPA temperature criteria would be a significant effect. Since this alternative does not include mechanical channel rehabilitation there would be no associated impacts to turbidity.

pg. 3-143

Central Valley. The elimination of TRD exports would significantly reduce the ability to meet temperature criteria in the Sacramento River. This is evidenced by an increase of ~~3~~ 7 percentage points in the frequency that Sacramento River temperatures would exceed the Biological Opinion temperature objectives, compared to the No Action Alternative. Shasta Reservoir carryover storage violations would increase 2 percentage points compared to No Action due to increased reliance on the reservoir to meet river temperature requirements in spring and early summer. Relative to No Action, modeled X2 position would increase 0.4 km in the average condition, 0.9 km in the wet condition, and 0.1 km in the dry condition. However, as previously noted, PROSIM operates the system to meet water quality standards in the Delta. PROSIM results also project reductions in Delta outflow in a number of months when No Action flows were already low – conditions when Delta water quality is especially susceptible to degradation. DSM2 Delta water quality results show varying increases in average monthly EC, bromide, and DOC concentrations during the months of March through September at Contra Costa Canal Intake, Old River at Highway 4, Delta-Mendota Canal Intake, and Clifton Court Forebay. The greatest increase is at the Delta-Mendota Canal Intake, where EC and bromide levels rise up to 23 percent in critical dry years and 30 percent under average conditions in the high export months of June and July. DOC concentrations are similar to No Action, except in October and November of critical dry years when levels increase up to 9 percent at the Delta-Mendota Canal Intake. Greens Landing and North Bay Aqueduct concentrations are similar to the No Action Alternative for the three constituents. The decreased ability to meet the Biological Opinion criteria and the potential for Delta water quality impacts would be significant impacts.

Flow Evaluation.

Trinity River Basin. ~~The frequency of Trinity River modeled temperature violations decreased in all water-year classes compared to No Action levels.~~ The frequency of Trinity River modeled temperature violations decreased in all water-year classes compared to No Action levels, as measured by compliance with the NCRWQCB and Hoopa EPA water quality criteria, except in extremely wet years where there are no modeled violations of the Hoopa EPA standards for either the Flow Evaluation or the No Action Alternative. This improvement in water temperature is the result of changing TRD export patterns from spring/summer to a summer only. Construction of the 47 new channel rehabilitation projects associated with this alternative would result in potentially significant short-term turbidity impacts in relation to NCRWQCB objectives (actual implementation of the projects would undergo a site-specific environmental review).

pg. 3-144

Central Valley. Sacramento River modeled temperature violations occurred at a ~~slightly~~ higher frequency than under the No Action Alternative (20.5 percent versus ~~19.7~~15.9). Violations occurred in both wet and dry conditions due to the variable nature of the standards. This impact would be significant. Modeled frequency of Shasta Reservoir carryover violations was the same as under No Action. The relatively small increase in frequency of temperature violations and the lack of change in carryover storage violations is at least partially attributable to the increase in demand for water under the 2020 condition. Because demand is forecast to occur downstream of compliance points in the Sacramento River, water deliveries assist in meeting temperature standards. Increased demand in the 2020 period results in lower carryover storage in the Central Valley reservoirs as system wide resources are used to meet demand.

Percent Inflow.
pg. 3-145

Trinity River Basin. Modeled Trinity River water temperature violations increased substantially in comparison to No Action. These violations are due in large part to the fact that summer releases would be as low as 27 cfs. Such low summer flows would be unable to meet temperature objectives, in spite of a shift in TRD exports from spring/summer to summer only. The resultant Trinity River temperature increases would be significant. Likewise, modeled violations of Hoopa EPA temperature standards relative to No Action increase in three of the five modeled water years; extremely wet, dry, and critically dry. The increased violations are a result of lower summer flows. Additional violations of the Hoopa EPA water quality standards would be a significant impact. Construction of 47 new channel rehabilitation projects would result in potentially significant short-term turbidity impacts in relation to NCRWQCB objectives (actual implementation of the projects would undergo a site-specific environmental review).

Central Valley. Sacramento River modeled temperature violations would occur slightly more frequently than No Action levels (20.1 percent versus ~~19.7~~15.9), resulting in a significant impact. The months with violations occur across wet and dry conditions due to the variable nature of the standards. The modeled frequency of Shasta carryover violations was the same as under No Action. In comparison with No Action, modeled position of X2 would increase 0.1 km over the period of record. In the wet condition, X2 would increase approximately 0.2 km. X2 would remain unchanged in the dry period. Delta standards continue to be met under this alternative. PROSIM results also project reductions in Delta outflow in a number of months when No Action flows were already low – conditions when Delta water quality is especially susceptible to degradation. DSM2 Delta water quality results are very similar to the No Action Alternative. The only exception is the increase in average monthly Bromide concentrations of up to 8 percent during the months of April through July, at the Delta-Mendota Canal under average and critical dry conditions. The decreased ability to meet the Biological Opinion criteria and the potential for Delta water quality impacts would be significant impacts.

State Permit.
pg. 3-146

Trinity River Basin. The State Permit Alternative had significantly more modeled water temperature violations due to the fact that summer release rates are too low. These modeled violations occurred in all five water-year classes. More frequent violations of Hoopa EPA temperature standards relative to No Action would occur in four of the five modeled water years. The additional violations are largely a result of lower flows than under No Action. The increased frequency of violations would be a significant impact. This alternative would not result in direct increases in turbidity, as no mechanical restoration projects are proposed.

pgs. 3-146 and 3-147

Central Valley. This alternative would result in a slight increase in temperature violations compared to the No Action Alternative (16.4 percent versus 15.9). Conditions would improve with regard to meeting ~~both Sacramento River temperature and~~ Shasta Reservoir carryover storage objectives as a result of the increased TRD exports compared to No Action levels. These months with temperature violations occurred across both wet and dry conditions due to the variable nature of the standards. Modeled X2 position decreased by 0.1 km in the average and wet conditions, and remained essentially unchanged in the dry period. In general Delta outflow would increase, resulting in improvements in Delta water quality. However, there are some critical dry years when modeled Delta outflows in November and December are reduced due to increased Delta exports to fill San Luis Reservoir (increased Delta pumping is associated with more water being available with this alternative). In these months, average monthly EC and bromide levels increase up to 11 percent at Contra Costa Canal Intake, Old River at Highway 4, Delta-Mendota Canal Intake, and Clifton Court Forebay. Such a potential impact would not be a result of the alternative, in that the effect is attributable to a modeled assumed increase in pumping rather than the alternative itself.

Existing Conditions versus Preferred Alternative.
pg. 3-147

Trinity River Basin. The modeled Preferred Alternative in the year 2020 has fewer temperature violations in the Trinity River than the modeled 1995 existing conditions. This is largely due to the diversion pattern under the Preferred Alternative that reduces Lewiston Reservoir warming in mid- to late-summer and the difference in minimum carryover storage. The most drastic improvement is modeled to occur in the critically dry water-year class. Construction of the channel rehabilitation projects would result in an increase in short-term turbidity impacts compared to existing conditions, resulting in potentially significant short-term turbidity impacts in relation to NCRWQCB objectives (actual implementation of the projects would undergo a site-specific environmental review). The Preferred Alternative would improve compliance over existing conditions in all water-year classes except extremely wet, where compliance would be the same as existing conditions. However, the watershed protection component of the Preferred Alternative would reduce sediment inputs into tributaries, and subsequently, into the Trinity River by 240,000-480,000 yd^3/yr, which is approximately 9-17 percent of the average annual sediment produced in the basin. Implementation of this alternative is assumed to result in beneficial effects.

pgs. 3-147 and 3-148

Central Valley. Modeled Sacramento River temperature violations would occur more frequently under the Preferred Alternative than under 1995 existing conditions (20 percent of the months compared to 14 percent). ~~However, most (87 percent) of the non-compliance is attributed to the increase in water demand assumed for the 2020 level of development.~~ Preferred Alternative carryover storage violations also increased compared to 1995 existing conditions, but all of the increase was attributed to non-project changes (e.g., population growth and higher contract demand). (In other words, the Preferred Alternative and No Action impacts are identical.) While PROSIM operates system resources to meet Delta water quality standards, there is a slight increase in modeled X2 position between existing conditions and the Preferred Alternative. Over the period of record average X2 position would increase approximately 0.4 km. In the wet period, X2 would increase approximately 0.9 km, while in the dry period, X2 is essentially unchanged. PROSIM results also project general reductions in Delta inflow and outflow, as well as a substantial increase in SWP exports at Banks Pumping Plant to meet increased 2020 level demands in the Preferred Alternative relative to existing conditions. Due to these changes in Delta conditions, DSM2 Delta water quality results show increases in average monthly EC, bromide, and DOC concentrations. EC and bromide levels generally increase during the months of October through March at Contra Costa Canal Intake, Old River at Highway 4, Delta-Mendota Canal Intake, and Clifton Court Forebay. The greatest increase is at the Delta-Mendota Canal Intake, where EC and bromide levels rise up to 20 percent in April of critical dry years. DOC concentrations increase up to 8 percent in April and May of critical dry years at the same locations. Greens Landing and North Bay Aqueduct concentrations are similar to the No Action Alternative for the three constituents. The decreased ability to meet the Biological Opinion criteria and the potential for Delta water quality impacts would be significant impacts.

Mitigation.
pgs. 3-149 and 3-150

Significant impacts identified for the increased frequency of Sacramento Basin temperature and carryover storage violations for the Maximum Flow~~, Flow Evaluation,~~ and Percent Inflow Alternatives would need to be evaluated by the NMFS pursuant to the ESA. Such consultation could result in modification of the existing Biological Opinion. Given the result of this consultation is unknown, this significant impact is considered to be unmitigable at this time.

The following mitigation could reduce impacts of temperature violations in the Sacramento River:

- Bypassing the Trinity Powerplant in order to provide colder water for diversion to the Sacramento River (see above).
- Reducing wet-season instream flow requirements for the Sacramento River to increase dry season carryover storage in Shasta Reservoir.
- If approved by EPA, rescheduling the wet season portion of the 200-cfs Iron Mountain Mine dilution flows to spring/summer in a way that would improve Sacramento River temperatures.

Impacts related to implementation of the Flow Evaluation Alternative (Preferred Alternative) were addressed during reconsultation with NMFS (see mitigation for water quality fish-related impacts under Fishery Resources).

The last paragraph on page 3-150 has been revised as follows:

~~Because the outcome of the planning processes described above remains unknown, water quality impacts to salmonid species in the Sacramento River are considered at present to be significant and unavoidable.~~ Additional discussion of these impacts are addressed in Section 3.5, Fishery Resources.

3.5 Fishery Resources *(SEE SUBSECTIONS)*

3.5.1 Native Anadromous Species (CHANGES FOLLOW)
pg. 3-152

Table 3-10 has been modified to include summer and fall rearing for chinook salmon. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-10.

pg. 3-155

Figure 3-35 has been modified to more accurately depict downstream migration of juvenile chinook salmon and to include the juvenile rearing periods of chinook and coho salmon and steelhead. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 3-35.

Affected Environment.

Trinity River Basin.
pgs. 3-159 and 3-160

Coho Salmon Populations. Trinity River coho salmon populations were historically much smaller than chinook salmon populations. Pre-dam estimates for coho salmon spawning above Lewiston were 5,000 fish (U.S. Fish and Wildlife Service/California Department of Fish and Game, 1956). Returns to Trinity River Hatchery for the period 1973-1980 averaged 3,300 adults (Leidy and Leidy, 1984). An average of 2,700 coho salmon returned to Trinity River Hatchery from 1991 through 1995. During this period, an average of 5,600 coho salmon spawned inriver, of which approximately 98 percent (5,500) were hatchery returns. From 1991 through 1995, naturally produced coho salmon spawning in the Trinity River upstream of the Willow Creek weir averaged 200 fish, ranging from 0 to 14 percent of the total annual escapement (an annual average of 3 percent). ~~Total run size for Trinity River coho salmon below Lewiston Dam for 1973 through 1980 averaged 3,300 adults (Leidy and Leidy, 1984). The estimate includes hatchery produc-tion. From 1991 through 1995 naturally produced coho salmon spawning in the Trinity River upstream of the Willow Creek weir averaged 200 fish, ranging from 0 to 14 percent of the total annual escapement (an annual average of 3 percent). Approximately 8,100 of the coho salmon spawning inriver are produced by the hatchery.~~ The average of 200 naturally produced coho salmon represents approximately 14 percent of the TRRP goal (Table 3-13).

pgs. 3-160 and 3-163

Species Listed and Proposed for Listing under the endangered Species Act (ESA) and California Endangered Species Act (CESA). The Southern Oregon/Northern California ESU of naturally produced coho salmon was listed as threatened pursuant to the ESA on April 25, 1997. This listing includes naturally produced coho from the Trinity River and Klamath River Basins. Critical habitat for the ESU was designted on May 5, 1999.

pg. 3-163

Fish Harvest. The harvest of Klamath River Basin fall chinook salmon (including Trinity River Basin) is managed jointly by the CDFG, Oregon Department of Fish and Wildlife, California Fish and Game Commission, Yurok Tribe, Hoopa Valley Tribe, NMFS, and BIA. The PFMC and the KFMC are allocation forums for the ocean and ocean/inriver fisheries, respectively. The mixed-stock ocean population is harvested by commercial and sport fisheries; and the inriver population is harvested by tribal (ceremonial, subsistence, and commercial) and sport fisheries. Chinook salmon harvest (both fall and spring) includes both naturally produced and hatchery-produced fish. ~~Coho salmon harvest has been prohibited along the west coast since 1994.~~ Coho harvest in the ocean commercial troll fishery has been prohibited in California and Oregon, and reduced in Washington, since 1994. Coho harvest has also been prohibited in the California ocean sport fishery, and reduced in Oregon. Coho harvest is allowed in the tribal inriver fisheries and currently occurs as incidental take during the harvest of chinook salmon. Table 3-13A presents Yurok and Hoopa Valley tribal harvest from 1984-1999. Steelhead are rarely caught in the ocean commercial and sport fisheries, but are harvested by the inriver tribal and sport fisheries.

See Section 2.3 Changes to the DEIS/EIR Tables and Figures for new Table 3-13A.

Central Valley.
pg. 3-168

Many factors affect the abundance of anadromous fishery resources in the Central Valley. Many of the same factors that resulted in declines in fishery resources over the past 150 years continue to plague existing populations. Those factors include: modification and loss of habitat, reduction in magnitude and change in timing of streamflows, damming and diversions, deterioration of water quality (including temperature), ~~increases in~~ sport and commercial harvest, and competition and genetic introgression with hatchery-produced fish. The direct cause and effect relationships of any one or all of these factors as they may have and continue to affect anadromous fish populations are unknown. Cumulatively, they have taken their toll on these species' ability to exist in the Central Valley. Ongoing efforts to arrest the decline and restore native anadromous fish populations, including projects resulting from the 1992 CVPIA, are ongoing in an attempt to reverse the decline of those populations.

3.5.2 Resident Native and Non-Native Fish (CHANGES FOLLOW)

Affected Environment.

Trinity River Basin.
pgs. 3-178 and 3-179

Non-native fish species found in the Trinity and Klamath River Basins include striped bass, American shad, brown trout, and brook trout. Striped bass have only recently been reported to occur in the Trinity and Klamath River Basins; reports are rare. American shad are known to occur in the lowermost portions of the Trinity River Basin, but are primarily found in the lower Klamath River Basin. Anadromous brown trout were propagated in the TRSSH until 1977 when this practice was discontinued because of the small numbers and the lack of anadromous characteristics of fish entering the hatchery. Currently, brown trout are largely limited to the upper portions of the river, although the California Department of Fish and Game, on occasion, capture brown trout in the estuary during the spring ~~some brown trout exhibit anadromous characteristics~~. Brook trout provide a significant sport fishery in the tributary streams and high elevation lakes of the Trinity River Basin. Its life cycle and habitat requirements are similar to that of brown trout.

Mitigation.
pg. 3-178

Anticipated significant impacts to anadromous salmonids in the Trinity River from implementation of the State Permit Alternative would be unmitigatable. Significant impacts requiring mitigation for adverse effects to anadromous salmonids in the Sacramento River system associated with the Maximum Flow~~, Flow Evaluation,~~ and Percent Inflow Alternatives would include reconsultation with NMFS under the 1993 Biological Opinion for Winter Chinook Salmon. In those years (primarily drought conditions) when carryover storage in Shasta Reservoir is less than 1.9 maf, Reclamation and NMFS would re-initiate consultation in an attempt to minimize losses of winter chinook salmon. Reclamation would re-operate Shasta Dam in an effort to reduce losses of winter chinook salmon to less than that resulting in a jeopardy opinion.

Impacts related to implementation of the Flow Evaluation Alternative (Preferred Alternative) were addressed during reconsultation with NMFS.

Per the NMFS' Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize Southern Oregon/Northern California Coast (SONCC) coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, or Central Valley steelhead. The NMFS does anticipate that SONCC coho salmon habitat adjacent to and downstream of the channel rehabilitation projects associated with the Preferred Alternative may be temporarily degraded during construction. Construction of these projects, which will create a substantial amount of additional suitable habitat, may temporarily displace an unknown number of juvenile coho salmon but is not expected to result in a lethal take. The NMFS does not anticipate that the implementation of the proposed action will incidentally take Central Valley spring-run chinook or Central Valley steelhead, but that the Preferred Alternative will result in a minute increase in the level of Sacramento River winter-run chinook incidentally taken in all years except critically dry years. In such years, Reclamation would be required to reinitiate

consultation per the existing Winter-run Central Valley Project Operations Criteria and Plan to develop year-specific temperature control plans. Implementation of the following reasonable and prudent measures specified in the NMFS BO to minimize the effects of incidental take shall be non-discretionary and will result in minimizing impacts of incidental take of SONCC coho salmon and Sacramento River winter-run chinook salmon in all years including critically dry years:

The Service and Reclamation shall:

1. Implement the flow regimes included in the proposed action (as described in the DEIS/EIR, page 2-19, Table 2-5) as soon as possible.
2. Ensure that NMFS is provided the opportunity to be represented during implementation of the Adaptive Environmental Assessment and Management program.
3. Ensure that the replacement bridges and other infrastructure modifications, needed to fully implement the proposed flow schedule, are designed and completed as soon as possible.
4. Periodically coordinate with NMFS during the advanced development and scheduling of the habitat rehabilitation projects described in the DEIS/EIR.
5. Complete “the first phase of the channel rehabilitation projects” (U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, 2000) in a timely fashion.
6. Implement emergency consultation procedures during implementation of flood control or “safety of dams” releases from Lewiston Dam to the Trinity River.
7. In dry and critically dry water-year classes, Reclamation and Service shall work cooperatively with the upper Sacramento River Temperature Task Group to develop temperature control plans that provide for compliance with temperature objectives in both the Trinity and Sacramento Rivers.

Implementation of these measures will be non-discretionary.

Lower Klamath River Basin/Coastal Area.
pg. 3-179

The following text has been added on page 3-179 as a new paragraph immediately after the first paragraph under Lower Klamath River Basin/Coastal Area:

Non-native species known to occur in the lower Klamath are similar to those found in upstream areas including the reservoirs. Some of these species include yellow perch, black crappie, green sunfish, gold shiner, and brown bullhead.

Mitigation
pg. 3-184

Anticipated significant impacts to resident fish in the Trinity River from implementation of the State Permit Alternative would be unmitigatable. Mitigation for impacts to the Delta smelt and Sacramento splittail associated with the Maximum Flow and Percent Inflow Alternatives would consist of consulting with the Service on impacts and implementing any required conservation measures.

Implementation of the Flow Evaluation Alternative (Preferred Alternative) was addressed through reconsultation with the Service.

Per the Service's Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize delta smelt and Sacramento splittail or adversely modify critical habitat for delta smelt. The Service has concurred with the determination that implementing the Preferred Alternative will not likely adversely affect the bald eagle and northern spotted owl. It is anticipated that delta smelt and Sacramento splittail will be adversely affected by implementing the Preferred Alternative and that incidental take may be affected in manner or extent not analyzed in the March 6, 1995 Biological Opinion on the Long-term Operation of the CVP and SWP. Therefore, the following reasonable and prudent measure to minimize the effects of incidental take was developed:

1. Reclamation shall minimize the effects of reoperating the resulting from the CVP implementation of the Preferred Alternative within the Trinity River Basin on listed fish in the Delta.

Implementation of this measure will be non-discretionary.

3.5.3 Reservoirs *(NO CHANGE)*

3.5.4 Ocean Fisheries Economics **(CHANGES FOLLOW)**

Affected Environment.

Trinity River Basin.
pg. 3-192

Ocean Sportfishing. Ocean sport salmon fishing takes place pri-marily from privately owned pleasure craft or charter boats. In 1996, there were 225,500 salmon angler trips for salmon in California and 43,900 in Oregon. About 80 percent of the California trips occurred in the San Francisco and Monterey Regions. About 65 percent of the angler trips for salmon in Oregon coastal waters occurred in the Northern/Central Oregon Coastal Region, which includes the port areas of Coos Bay, Newport, and Tillamook.

Ocean Commercial Fishing. Commercial salmon fishing in the coastal regions has been regulated by the PFMC since 1977. Prior to 1977, the fisheries were regulated by their respective states. ~~since 1977 in California and 1979 in Oregon.~~ Regulation of commercial salmon fishing to protect various stocks of salmon has substantially affected the fishing effort along the West Coast in some years by reducing the number of days when fishing is allowed. This has led to reductions in total catch and associated gross and net income received by the salmon harvesting industry. This has been especially true since 1991 in the Klamath Management Zone (KMZ), a special management area established primarily to protect Klamath and Trinity River salmon (Figure 3-37).

pgs. 3-192 and 3-195

Salmon harvest trends have been somewhat different south of the KMZ, with average harvest levels remaining relatively high through the late 1980s. Since 1989, however, commercial salmon harvest levels in the Mendocino Region (equivalent to the PFMC and CDFG statistical area of Fort Bragg) have fallen, almost disappearing between 1992 and

1995, before increasing to 20,000 salmon in 1996. The 1996 harvest was still 90 percent lower than the 1971-1990 average. Commercial salmon harvests in the San Francisco Region have remained relatively constant over the last 25 years averaging 193,500 salmon harvested per year, although harvests dropped dramatically to 67,000 in 1992 when harvest levels along the West Coast fell substantially. Harvests have rebounded to some extent, with 152,000 salmon harvested in the San Francisco Region in 1996. In 1996, 181,000 salmon were harvested in the Monterey Region, exceeding the average of 104,000 for 1971-1990.

pg. 3-193

Figure 3-37 has been modified to correct a spelling error: "Haceta Head" has been changed to "Heceta Head." See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 3-37.

pg. 3-195

The Oregon ocean commercial salmon fishing industry generated approximately $3.0 million in gross revenue in 1996, with approximately 93 percent of this revenue generated in the Northern/Central Oregon Region and the remainder in the KMZ-Oregon Region. In California, gross revenues from commercial salmon fishing totaled $5.7 million in 1996, which is lower than the $7.8 ~~substantially lower than the $22.7~~ million (in 1997 dollars) in average annual gross income generated by the industry between 1971 and 1990. Net income received by the salmon harvesting industry has historically averaged approximately 33 percent of gross salmon revenues in Oregon and 39 percent of gross salmon revenues in California.

pgs. 3-196 through 3-203

Tables 3-19 and 3-20 were inserted in the DEIS/EIR in reverse order. The table numbers and placement in text have been corrected. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised table numbers.

Environmental Consequences.
pg. 3-199

No Action. Angler benefits associated with ocean sportfishing for salmon are shown by region in Tables 3-20 and 3-21. Across all regions, this alternative generates an estimated ~~$35.2~~$42.2 million in angler benefits, with San Francisco and Monterey accounting for ~~nearly 56~~ more than 46 percent of all angler benefits. Harvest levels, gross revenues, and net income associated with ocean commercial fishing for salmon are shown in Table 3-21. Under the No Action Alternative, net income associated with ocean commercial fishing for salmon across all regions is estimated at $6.8 million, with the Northern/Central Oregon Coastal Region accounting for nearly 40 percent of this total.

3.6 Tribal Trust *(NO CHANGE)*

3.7 Vegetation, Wildlife, and Wetlands *(SEE SUBSECTIONS)*

3.7.1 Vegetation **(CHANGES FOLLOW)**
pg. 3-230

Table 3-24 has been modified to more accurately define the classifications under the Califonia Native Plant Society. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-24.

pg. 3-233

Table 3-25 has been modified to more clearly and accurately define the classifications under the California Native Plant Society. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-25.

Environmental Consequences.
pg. 3-238

Significance Criteria. Impacts on vegetation would be significant if project implementation would result in any of the following:

- Potential for reductions in the number, or restrictions of the range, of an endangered or threatened plant species or a plant species that is a candidate for state listing or proposed for federal listing as endangered or threatened
- Potential for substantial reductions in the habitat of any native plant species including those that are listed as endangered or threatened or are candidates (CESA) or proposed (ESA) for endangered or threatened status
- Potential for causing a native plant population to drop below self-sustaining levels
- Potential to eliminate a native plant community
- Substantial adverse effect, either directly or through habitat modifications, on any plant identified as a sensitive or special-status species in local or regional plans, policies, or regulations
- Substantial adverse effect on any riparian habitat or other sensitive natural community identified in local, ~~or~~ regional, or state plans, policies, or regulations
- Substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means
- A conflict with any local policies or ordinances protecting vegetation resources
- A conflict with, or violation of, the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, state, or federal habitat conservation plan relating to the protection of plant resources

3.7.2 Wildlife *(NO CHANGE)*
3.7.3 Wetlands *(NO CHANGE)*

3.8 Recreation *(SEE SUBSECTIONS)*

3.8.1 Riverine **(CHANGES FOLLOW)**

Affected Environment.

Trinity River Basin.
pg. 3-262

Federal, State, and Local Plans/Wild and Scenic River Designations. Congress enacted the National Wild and Scenic Rivers Act in 1968, in an effort to protect free-flowing rivers with "outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values." The entire mainstem of the Trinity River was designated a National Wild and Scenic River by the Secretary in 1981, primarily because of the river's anadromous fishery (46 FR 7484). In addition, the reach of the river downstream from Lewiston Dam was classified as having distinctive scenic quality and high peak flow viewer sensitivity[11]. Approximately 97.5 miles of the river are also classified as recreational under the Act.

pg. 3-263

Recreation Resources and Opportunities. During the primary recreation season, water-dependent and water-enhanced Trinity River recreation includes boating, kayaking, canoeing, rafting, inner-tubing, fishing, swimming, wading, camping, gold panning, nature study, picnicking, hiking, and sight-seeing[12]. In addition, fishing for chinook salmon, steelhead, and rainbow and brown trout is a major recreational activity on the Trinity River throughout the remainder of the year as well as some boating activities.

Environmental Consequences.

Methodology.
pg. 3-264

Recreation Opportunities Methodology. The mainstem of the Trinity River is the primary focus of the recreational opportunities analysis. During the primary recreation season, Trinity River flows are most influenced by Lewiston releases in the summer months given tributary flow is generally not much of a factor during this period. Many of the recreation activities, in particular white-water kayaking and rafting, are most prevalent downstream of the river's confluence with the North Fork of the Trinity River. At this location, Lewiston releases play a minor role in Trinity River flows compared to inflows from the North Fork. Impacts to recreational opportunities within the lower Klamath River Basin, aside from sportfishing, are considered to be less than significant as the limited amount of recreation that does occur in this reach of the river is not substantially influenced by Lewiston Dam releases. (Impacts to ocean sportfishing are discussed in Section 3.5.4, Ocean Fishery Economics.)

[11] At peak flows, the scenic qualities of the river are enhanced.

[12] The primary recreation season is defined as Memorial Day to Labor Day, or approximately the last week of May to the end of the first week in September.

pg. 3-265

Recreation Use and Benefits Methodology. The methodology for determining recreation use and benefits within the Trinity River Basin and the Lower Klamath River Basin/Coastal Area is based on river flow and fish population conditions. Annual recreation use relationships were estimated for four activities that occur along the river: boating, swimming, fishing, and hiking and other river-enhanced activities (i.e., off-river activities). The relationship of river flow and fish populations to these activities was generally found to be positive, implying the greater the flow or fish population, the greater the expected inriver recreation use. Due to model limitations, the recreation use and benefit analyses do not account for species substitution.

pg. 3-267

Table 3-32 has been modified to more accurately reflect white-water activities and preferred flow ranges. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-32.

Flow Evaluation.

Trinity River Basin.
pg. 3-269

Despite the adverse temporary impacts to recreation opportunities as listed above, overall annual recreation use on the Trinity River is expected to increase by 91,600 visitor days, or about 22 percent, as compared to No Action levels (Table 3-34). Boating and fishing activities are expected to increase the most. Annual recreation benefits are estimated to increase by $3.3 million.

pgs. 3-273 and 3-275

Table 3-33 has been modified to more accurately reflect white-water conditions. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-33.

3.8.2 Reservoirs (CHANGES FOLLOW)

Environmental Consequences.
pg. 3-282

No Action.

Trinity River Basin. Under the No Action Alternative, use of certain boating facilities, such as the Stuart Fork boat ramps, Fairview Ramp, and major marinas would continue to be moderately constrained during the recreation season (See Table 3-36). Recreation use of Trinity Reservoir is expected to be about ~~796,000~~ 803,600 visitor days in 2020. Annual recreation benefits are estimated to be $~~8.7~~8.8 million (Table 3-37 at end of Section 3.8.2).

Maximum Flow.

Trinity River Basin. Under the Maximum Flow Alternative, Trinity Reservoir levels would generally be lower than No Action levels during the recreation season. A number of major recreation facilities would be less available compared to No Action levels (Table 3-36). This decrease in facility availability would be a significant impact. Annual recreation use of

Trinity Reservoir is expected to decrease by ~~30,000~~37,400 visitor days, or about ~~4~~ 5 percent, compared to No Action levels. Recreation benefits would decrease by $~~327,000~~ 408,000 annually.

pg. 3-283

Flow Evaluation.

Trinity River Basin. Trinity Reservoir water-surface elevations would not be significantly below threshold levels for any of the major facilities under this alternative. Projected recreation facility availability would decrease slightly for Stuart Fork Ramps and Fair View Ramp. Major marina relocations would be required 2 percent less often as compared to the No Action Alternative. Under the Flow Evaluation Alternative, the availability of Trinity Center Ramp and Minersville Ramp would remain unchanged from No Action, and campground availability would increase by 1 percent. Annual recreation use is expected to be essentially the same as under the No Action Alternative. Recreation use and benefits would change by less than 1 percent. ~~Recreation facility availability would increase slightly compared to No Action levels. Annual recreation use is expected to increase by 6,600 visitor days, or about 1 percent, compared to No Action levels. Recreation benefits would increase by $71,900 annually.~~

Percent Inflow.

Trinity River Basin. Under the Percent Inflow Alternative, Trinity Reservoir levels would drop slightly in summer months compared to No Action levels, resulting in a slight decrease in the usability of certain recreation facilities, including the Stuart Fork Ramp, the Fairview Ramp, and the Trinity Center Ramp. However, no significant decrease in facility availability is anticipated. However, campground use is predicted to increase slightly compared to No Action conditions because of better access conditions. ~~Overall, annual recreation use of Trinity Reservoir is expected to increase by 13,500 visitor days, or about 2 percent, compared to No Action levels. Recreation benefits would increase by $147,200 annually.~~ Overall, annual recreation use of Trinity Reservoir is expected to be essentially the same as under No Action (model predictions show use and benefits increasing by less than 1 percent).

pg. 3-284

State Permit.

Trinity River Basin. Under the State Permit Alternative, Trinity Reservoir levels would be slightly higher during the primary recreation season as compared to the No Action Alternative. The availability of all recreation facilities would increase compared to No Action levels, except for the Minersville Ramp, which would remain available during the entire recreation season for both alternatives. Annual recreation use of Trinity Reservoir would increase by ~~44,800~~37,400 visitor days, or about ~~6~~ 5 percent. Recreation benefits would increase by $~~488,300~~408,000 annually.

pg. 3-287

Table 3-36 has been modified to correct Trinity Reservoir recreation facility availability data. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-36.

pg. 3-289

Table 3-37 has been modified to more accurately reflect Trinity Reservoir recreation benefits and visitor days under the No Action Alternative. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-37.

pg. 3-291

Table 3-38 has been modified to more accurately reflect Trinity Reservoir recreation benefits and visitor days under the No Action Alternative. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-38.

3.9 Land Use *(SEE SUBSECTIONS)*

3.9.1 Residential/Municipal and Industrial (CHANGES FOLLOW)

Environmental Consequences.

Methodology.
pg. 3-302

Any new supplies acquired to eliminate shortfall in the average condition are assumed to be available to reduce shortage in the dry condition. Therefore, ~~incremental costs in the dry condition are reduced by supplies acquired to meet demand in the average condition~~ dry condition costs, which are above and beyond average condition costs, consider the yield of all supplies developed to meet average demand.

No Action.

Central Valley/CVP Service Area.
pg. 3-305

Regionwide, the Bay Area would have more than adequate supplies (an assumed excess of 8,800 af) due in part to a surplus in the South Bay subregion (14,600 af). This does not imply that additional supplies during average years will never have economic value. Rather, it is expected that most additional water supplies obtained in above-average years will not be needed. However, the CCWD is assumed to need to acquire 5,800 af of new supplies to meet demand.

Existing Conditions versus Preferred Alternative.
pg. 3-310

Central Valley. Table 3-42 at the end of Section 3.9.1 compares the Preferred Alternative in 2020 to existing conditions (i.e., 1995). Population across all regions in the year 2020 is assumed to be approximately double that of the existing conditions population, resulting in an increase in demand. As described in Section 2.1.2, ~~CVP supplies for M&I use are assumed to increase to meet this demand~~ maximum deliveries unconstrained by supply are able to increase up to current contract or water rights amounts unless local environmental documentation for increased use is not completed.

3.9.2 Agriculture *(NO CHANGE)*

3.9.3 Real Estate **(CHANGES FOLLOW)**

pg. 3-329

This section assesses each of the alternatives from the perspective of residential real estate impacts. The evaluation focuses on residential properties adjacent to reservoirs~~ and rivers~~. River properties were not evaluated due to the ambiguous nature of the overall impact. Since some river properties may benefit from the improved fishery and others may suffer from flooding, no clear relationship could be assumed.

Affected Environment.

Trinity River Basin. Trinity Reservoir is the only reservoir in this region where residential real estate impacts are expected. Lakeside development is limited to Trinity Center and Covington Mill, both of which are located on the west side of the reservoir along Route 3. ~~The potentially affected reach of the Trinity River consists of the portion downstream of Lewiston Dam. A number of small residential communities are found along this reach including Lewiston, Douglas City, Junction City, Big Bar, Del Loma, Burnt Ranch, Salyer, and Willow Creek.~~

pg. 3-330

Lower Klamath River Basin/Coastal Area. ~~The affected area in this region is limited to the lower reach of the Klamath River downstream of Weitchpec. This area falls entirely within the boundaries of the Yurok Reservation.~~ No impacted reservoirs are found in this region.

Environmental Consequences.

Methodology. Real estate impacts were assessed based on the assumed relationship between residential property values and ~~both ~~reservoir water levels~~ and inriver fish harvests~~. Since information for quantifying changes to property values was unavailable, the speculated relationship allowed only for a ranking of the alternatives.

~~Based on the assumptions that people prefer to live along healthy rivers, and fish harvests reflect river health, naturally produced salmon and steelhead inriver fish harvests were used to rank potential impacts to Trinity River property values. Implicit in this assumption are higher flows and possible flooding; however, flooding effects were discounted under the assumption that such impacts would be mitigated (see Section 3.9.1). Impacts to property values along the lower Klamath River were not assessed because of the high level of uncertainty about a relationship between Trinity River fish harvests and lower Klamath land values.~~

Significance Criteria. Property value significance criteria were not established because of the uncertainty in estimating quantitative relationships between property values and reservoir water levels~~ and inriver fish harvests.~~

pg. 3-331

No Action.

Trinity River Basin. The No Action Alternative assumes the current flow schedule would continue. Based on average water levels and annual monthly fluctuation, this alternative ranked ~~fourth~~ fifth overall from the perspective of Trinity Reservoir property value impacts (Table 3-43). ~~From a Trinity River property value perspective, this alternative ranked fifth.~~

Maximum Flow.

Trinity River Basin. This alternative ranked second overall in terms of Trinity Reservoir property values. From the long-term perspective, this alternative ranked first; however, from the short-term perspective, this alternative ranked last. ~~The alternative ranked first in terms of Trinity River property values (harvest levels were ten times those of No Action).~~

Flow Evaluation.

Trinity River Basin. By placing second in each of the three water level measures, this alternative ranks first overall ~~F~~from a Trinity Reservoir property value perspective~~, this alternative ranks first overall. From a Trinity River property value perspective, this alternative ranked second~~.

Percent Inflow.

Trinity River Basin. This alternative ranked ~~third~~ fourth overall in terms of Trinity Reservoir property values ~~(tied with State Permit Alternative). From a Trinity River property value perspective, this alternative ranked third~~.

Mechanical Restoration.

Trinity River Basin. This alternative ranked ~~fourth~~ fifth overall in terms of Trinity Reservoir property values (tied with No Action due to the identical hydrology). ~~This alternative also ranked fourth from a Trinity River property value perspective.~~

pg. 3-332

State Permit.

Trinity River Basin. The State Permit Alternative ranked first based on short-term drawdown to Trinity Reservoir, but last based on long-term fluctuation. Overall, the alternative tied for third in terms of Trinity Reservoir property values. ~~From a Trinity River perspective, the alternative ranked last.~~

Existing Conditions versus Preferred Alternative.

Trinity River Basin. In terms of Trinity Reservoir water levels, the Preferred Alternative in the year 2020 was virtually identical to 1995 conditions from the short-term drawdown perspective, but substantially better in terms of long-term fluctuations. Therefore, the Preferred Alternative would increase property values. ~~Trinity River fish harvests are expected to increase under the Preferred Alternative compared to 1995; therefore, property values along the river should increase.~~

pg. 3-333

Table 3-46 has been modified to more accurately reflect Trinity Reservoir property value impact rankings under each alternative. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-46.

3.10 Power Resources (CHANGES FOLLOW)

Affected Environment.

pg. 3-335

The following text has been added immediately after Affected Environment:

CVP Generation in Relation to Total California Generation and Demand. California's annual energy demand in 1998 was approximately 250,000 gigawatt-hours (GWh) (California Energy Commission, 2000). Demand for energy is projected to grow at approximately 2.0 percent annually between 2000 and 2010, resulting in a projected demand of 320,000 GWh in 2010. Peak demand in California typically occurs in late afternoons during the month of August in response to a string of days with high-temperatures (California Energy Commission, 1999). California's peak demand in 1999 was approximately 51,000 MW and is projected to grow at approximately 1.7 percent annually between 2000 and 2010, resulting in a peak demand of 61,000 MW in 2010. In comparison, total installed capacity of CVP generation is approximately 2,000 MW, although actual capacity is typically less. Actual capacity is less than installed capacity because hydrologic variation and competing uses such as water delivery and environmental requirements reduce the ability of the generators to operate at maximum capacity. The total installed CVP generation capacity of 2,000 MW equates to 4 percent of California demand in 1999, and 3 percent of projected 2010 demand. The TRD accounts for 25 percent (approximately 500 MW) of CVP installed capacity, which equates to approximately 1 percent of current California demand, and less than 1 percent of projected 2010 demand.

Currently, according to the Western Systems Coordinating Council, approximately 3,700 MW (which represents more than the total generation capability of the entire CVP) of new powerplants (six individual projects in total) in California are either under construction or have gained full regulatory approval. Approximately 7,500 MW of new powerplants (15 projects) have applications under review, and another 2,000 MW of new powerplants (three projects) have begun the application process. The majority of pending and proposed powerplants are natural gas-fired turbines, and a small minority (approximately 100 MW) would be either wind or geothermal powered. All of these powerplants have an anticipated "on-line" date prior to June 2004. Recent demand growth has outstripped current available capacity, leading to several statewide alerts regarding insufficient reserves of available capacity. Completion of additional powerplants is anticipated to help avoid such alerts in the future. Construction of additional generating capacity is taking place, and will continue to take place, independent of any decision regarding the Trinity River Mainstem Fishery Restoration.

Power Generation and Purchase.
pg. 3-340

Current Power Marketing. ~~The value of CVP hydropower available for sale is determined by the market.~~ Western sets prices for CVP hydropower based on its costs for delivering power to customers. However, the value of power that Western sells to customers is set by the external power market and can fluctuate based on on- and off-peak supplies. Although the value and annual project output can fluctuate, Western's costs remain essentially unchanged. This causes Western's per-unit cost of electricity to vary. When long-term average generation decreases, Western's customers receive less electricity and are required to pay a higher per-unit cost. If Western rates are relatively low, Western customers are likely to continue to purchase power from Western as part of their long-term resource mix. For planning purposes, power customers evaluate capacity resources based on dry conditions in order to ensure reliability.

Methodology.
pg. 3-346

The following text has been added as the first paragraph immediately after Methodology:

A detailed assessment regarding the impact of CVP power supplies on the greater California region has not been made, other than what is presented in the Socioeconomics section. It is anticipated that as demand for power increases, additional power supplies will be built to meet the increase in total California demand. As this occurs, the CVP's current total contribution of meeting 4 or less percent of total California electrical demand will constitute a decreasing proportion of the state's overall power generation supply.

The value of energy produced by the CVP was estimated using a marginal ~~unit efficiency~~ heat rate approach, meaning that as low-cost generating resources are ~~decreased~~ loaded (supplying power to their maximum capacity), higher-cost, less efficient resources are brought on-line as they become economically viable. Value was assigned to generation based on the month and time of day in order to assess on-peak and off-peak generation.

Significance Criteria.
pg. 3-349

In order to assess the severity of the impacts, the following significance criteria were developed:

- A 50 MW reduction in synthetic dry-year capability available for sale to preference power customers in January, February, March, June, July, August, September, or December (the months typically most sensitive to reduced capacity). Capability is defined as the amount of CVP capacity that can be sustained (given flow constraints) that efficiently supplies electricity to meet demands.
- A reduction of 5 percent or more in the annual energy available for sale to preference power customers ~~over the modeled period~~ in the average year.

- A reduction of 5 percent or more in the average energy available for sale to preference power customers during any month ~~over the modeled period~~ in the average year.
- Any decrease in CVP power that results in an increase in either an average preference power customer or a high-allocation preference power customer's average power cost by $0.50 per megawatt-hour (MWh).

Mitigation.
pgs. 3-350 and 3-351

The following text has been added as the first paragraph, moving the original first paragraph to the place of second paragraph, immediately following Mitigation:

Operating criteria would be established to allow Western to respond to various emergency situations in accordance with their obligations to the North American Electric Reliability Council. This commitment would also provide for exemptions to a given alternative's operating criteria during search and rescue situations, special studies and monitoring, dam and powerplant maintenance, and spinning reserves. Such exemptions for responding to various emergency situations would be consistent with the Presidential Memorandum, dated August 3, 2000, directing federal agencies to work with the State of California to develop procedures governing the use of backup power generation in power shortage emergencies.

Potentially significant power-related impacts could occur as a result of decreased surface-water supplies associated with the Maximum Flow, Flow Evaluation, and Percent Inflow Alternatives. Although water supply changes per se were not considered an impact, the development of additional water supplies to meet demands would lessen the associated impacts. Conceptually, any additional water supply or demand reduction would free up water for use by other, competing uses. A number of demand-and supply-related programs are currently being studied across California, many of which are being addressed through the on-going CALFED and CVPIA programs and planning processes. Although none of these actions would be directly implemented as part of the alternatives discussed in this DEIR/EIS, each could assist in offsetting impacts resulting from decreased Trinity River exports.

Power-related benefits associated with such programs would only occur if operations were conducted to provide increased generation; otherwise, implementation of such programs could negatively affect power resources.

Examples of actions being assessed in the CALFED and CVPIA planning processes include:

- Develop and implement additional groundwater and/or surface-water storage. Such programs could include the construction of new surface reservoirs and groundwater storage facilities, as well as expansion of existing facilities. Potential locations include sites throughout the Sacramento and San Joaquin Valley watersheds, the Trinity River Basin, and the Delta.
- Purchase long- and/or short-term water supplies from willing sellers (both in-basin and out-of-basin) through actions including, but not limited to, temporary or permanent land fallowing.

- Facilitate willing buyer/willing seller inter- and intra-basin water transfers that derive water supplies from activities such as conservation, crop modification, land fallowing, land retirement, groundwater substitution, and reservoir re-operation.
- Promote and/or provide incentive for additional water conservation to reduce demand.
- Decrease demand through purchasing and/or promoting the temporary fallowing of agricultural lands.
- Increase water supplies by promoting additional water recycling.
- Develop or construct generation for use by CVP customers.
- Purchase replacement power resources to offset losses of CVP generation.
- Modify the current CVP Cost Allocation policy to ensure that costs allocated to CVP preference power customers are reduced in an amount equal to the cost of acquiring replacement power.

pg. 3-353

Table 3-49 has been modified to more clearly and accurately reflect costs comparing existing conditions to the Preferred Alternative. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Table 3-49.

3.11 Socioeconomics **(CHANGES FOLLOW)**
pg. 3-355

This section presents regional information on socioeconomic conditions and impacts. As required by NEPA, the impacts of each alternative are compared to the No Action Alternative generally represented by ~~in the year~~ 2020 conditions (except for up-front impacts, which are based on 2001 conditions). While impacts are generally based on 2020 conditions, for purposes of consistency, all dollar estimates reflect 1997 dollars unless otherwise stated. Although CEQA does not require any discussion of socioeconomic impacts, this section nevertheless, to be consistent with other sections, compares the impacts of the Preferred Alternative in the year 2020 (Flow Evaluation plus watershed protection work from the Mechanical Restoration Alternative) to existing conditions, i.e., 1995.

Affected Environment.

Central Valley.
pg. 3-366

Current Social Conditions. Central Valley farmers who depend on irrigation are being affected by a wide array of decisions affecting their way of life, many of which are outside their control. For example, changes in farm subsidies and water supplies are accumulating. While farming has always had risks and uncertainties associated with it, recent changes have increased those elements. The loss of control some farmers feel has increased their stress and concern for maintaining their way of life.

Environmental Consequences.

Maximum Flow.

Trinity River Basin.
pg. 3-375

Up-front Impacts. The costs associated with the Maximum Flow Alternative are expected to generate $3.6-6.2 million in total industry output, $1.8-3.0 million in place of work income, and 45-77 additional jobs depending on the dam modification option (Table 3-54). This represents more jobs in Trinity County than any other alternative due primarily to the dam modification component. These dam modification costs are anticipated to last at most a couple of years, implying only a short-term impact. After dam modification is complete, job generation drops off dramatically. The 77 additional jobs reflect an insubstantial 1.5 percent of projected 2001 Trinity County employment. Despite the fact that the dam modification costs are based on preliminary estimates, it is likely that the up-front cost-based impacts involve a higher degree of certainty compared to the annual 2020 impacts given their near-term nature and recent experience with several of the cost elements.

Annual Impacts.
pgs. 3-375 and 3-376

2020 Economic Impacts: Under the Maximum Flow Alternative, the Trinity/Shasta County regional economy would be negatively affected by decreases in spending associated with water-oriented recreation. Although recreation-related spending associated with use of the Trinity River would increase, these effects would be more than offset by decreases in recreation-related spending associated with use of Trinity and Shasta Reservoirs. Annual regional economic output would decrease by an estimated $~~6.3~~ 6.6 million, place of work income by $~~2.6~~ 2.7 million, and employment by ~~66~~ 70 jobs (Table 3-54). These changes are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase $2.0 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by ~~39~~ 41 jobs, with ~~25~~ 26 of those occurring in the retail trade sector. These impacts are not considered substantial.

Flow Evaluation.

Trinity River Basin.

Annual Impacts.
pg. 3-382

2020 Economic Impacts: Under the Flow Evaluation Alternative, the Trinity/Shasta County regional economy would be positively affected by increases in spending associated with increases in water-oriented recreation. Recreation-related spending associated with increases in use of the Trinity River and Trinity Reservoir would more than offset the decreases in recreation-related spending associated with projected declines in use at Shasta Reservoir. Annual regional economic output would increase by an estimated $~~3.2~~$3.0 million, place of work income would increase by $~~2.0~~ 1.8 million, and employment

would increase by ~~66~~ 62 jobs (Table 3-51). These increases are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase $1.7 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to increase by ~~43~~ 41 jobs, with ~~41~~ 39 of those occurring in the retail trade and lodging sectors. These impacts are not considered substantial.

<u>Percent Inflow</u>.

<u>Trinity River Basin</u>.

Annual Impacts.
pg. 3-387

2020 Economic Impacts: Under the Percent Inflow Alternative, the Trinity/Shasta County regional economy would be negatively affected by decreases in spending associated with declines in water-oriented recreation. Although recreation-related spending associated with use of Trinity Reservoir would increase, these effects would be more than offset by decreases in recreation-related spending associated with declines in use at Shasta Reservoir and along the Trinity River. Annual regional economic output would decrease by an estimated $~~500,000~~ 800,000, place of work income would decrease by $~~300,000~~400,000, and employment would decrease by ~~8~~ 12 jobs (Table 3-54). These decreases, however, are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase by less than $10,000 annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by ~~5~~7 jobs, with ~~3~~4 of those occurring in the retail trade sector. These impacts are not considered substantial.

<u>Mechanical Restoration</u>.

<u>Trinity River Basin</u>.

Annual Impacts.
pg. 3-392

2020 Economic Impacts: The Trinity/Shasta County regional economy would be positively affected by the Mechanical Restoration Alternative. The only changes in recreation-related spending would be associated with slight increases in use of the Trinity River for sportfishing. Annual regional economic output would increase by an estimated $~~110,000~~130,000, place of work income would increase by $~~60,000~~70,000, and employment would increase by 2 jobs (Table 3-54). These increases are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase by less than $50,000 annually.

State Permit.

Trinity River Basin.

Annual Impacts.
pgs. 3-395 and 3-396

2020 Economic Impacts: Under the State Permit Alternative, the Trinity/Shasta County regional economy would be negatively affected by decreases in spending associated with declines in Trinity River recreation. Although recreation-related spending associated with use of Trinity and Shasta Reservoirs would increase, these effects would be more than offset by decreases in recreation-related spending along the Trinity River. Annual regional economic output would decrease by $~~5.9~~ 6.2 million, place of work income would decrease by $~~3.5~~ 3.6 million, and employment would decrease by ~~115~~ 119 (Table 3-54) jobs. These changes are not substantial. Revenues specific to businesses in Trinity County are estimated to decrease by $1.8 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by ~~74~~ 76 jobs, with ~~70~~72 of those occurring in the retail trade and lodging sectors. The adverse impacts on the lodging sector are substantial.

No Action versus Preferred Alternative.
pg. 3-400

The following two sentences were erroneously placed under Up-front Impacts in the DEIS/EIR. They have been deleted from Up-front Impacts and have been added to No Action versus Preferred Alternative.

The Preferred Alternative consists of the Flow Evaluation Alternative plus the watershed protection component of the Mechanical Restoration Alternative. Therefore, all socioeconomic impacts associated with the Preferred Alternative, other than costs, are identical to those of the Flow Evaluation Alternative.

Trinity River Basin.

Up-front Impacts. ~~The Preferred Alternative consists of the Flow Evaluation Alternative plus the watershed protection component of the Mechanical Restoration Alternative. Therefore, all socioeconomic impacts associated with the Preferred Alternative, other than costs, are identical to those of the Flow Evaluation Alternative.~~ The costs associated with the Preferred Alternative are expected to generate $2.1 million in output/sales, $1.1 million in income, and 37 jobs annually in Trinity County (Table 3-54). The majority of these impacts stem from the combined cost of constructing the channel rehabilitation sites and the watershed protection program. Impacts taper off gradually until the channel rehabilitation sites are completed in year 6. At that point, impacts decline by 50 percent and represent primarily the watershed protection program. Given the peak level of job creation represents less than 1 percent of the projected total employment in Trinity County in 2001, the total impacts associated with the Preferred Alternative are not substantial.

Existing Conditions versus Preferred Alternative.

Trinity River Basin.

Economic Impacts.
pg. 3-401

Annual Impacts: Under the Preferred Alternative, the Trinity/Shasta County regional economy would be positively affected by increases in spending associated with increases in water-oriented recreation. Annual regional economic output would increase by $2.6 billion, place of work income would increase by $~~1.4~~ 1.5 billion, and employment would increase by 35,900 jobs (Table 3-54). More than 99 percent of these changes in economic activity are attributable to the effects of increased population on recreation use and spending associated with the Trinity River and Trinity and Shasta Reservoirs. Project-related effects are not substantial.

pgs. 3-405 through 3-410

Tables 3-54 and 3-55 have been modified to more accurately reflect annual economic impacts under each alternative. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Tables 3-54 and 3-55.

3.12 Cultural Resources (CHANGES FOLLOW)

Environmental Consequences.
pg. 3-417

Flow Evaluation. ~~Trinity Reservoir levels would be lower than levels under the No Action Alternative in all months.~~ The increased frequency of water levels fluctuations compared to No Action could result in increased exposure of cultural resources within the inundation zone. Such an impact could be significant.

3.13 Air Quality *(NO CHANGE)*

3.14 Environmental Justice (CHANGES FOLLOW)

Environmental Consequences.

Maximum Flow.

Trinity River Basin and Lower Klamath River Basin/Coastal Area.
pg. 3-427

With the exception of the San Francisco Coastal Area, there would be no substantial environmental justice impacts to non-Native Americans in the Trinity River Basin and Lower Klamath River Basin/Coastal Area. In the San Francisco Coastal Area the adverse impacts on ~~agriculture~~ agricultural employment would be concentrated in the Santa Clara Valley. The demographics of Santa Clara County indicate that the alternative would have substantial environmental justice impacts. In 1996, the minority and Hispanic populations were 47 and 23 percent, respectively, of the county's population, with over 80 percent of the farm workers in the county being of Hispanic descent.

Central Valley. Substantial adverse agricultural employment impacts would occur in the Tehama-Colusa service area. This area includes Glenn, Colusa, and Yolo Counties. Based

on Census Bureau data, 18.7, 17.3, and 15.5 percent, respectively, of the people in these counties live below the poverty level, compared to 16.5 and 13.8 percent, respectively, for the state of California and the United States. Only Colusa County has a minority population greater than 40 percent. With impacts being specific to the agricultural sector, and most of the farm workers being Hispanic, the loss of jobs by Hispanic farm workers in Colusa County would be a substantial environmental justice impact.

Substantial adverse agricultural employment impacts would occur along the San Luis Canal for those users entirely dependent on CVP contracts. This includes the counties of Merced and Madera. Census Bureau data indicate that both counties have significant minority populations, low median incomes, and high percentages of people in poverty (25.9 and 20.8 percent, respectively). Therefore, the substantial impacts to agriculture would have substantial environmental justice impacts in these two counties.

4.0	**Other Impacts and Commitments**	*(SEE SUBSECTIONS)*
4.1	**Cumulative Impacts**	*(SEE SUBSECTIONS)*
4.1.1	**Implementation of Central Valley Project Improvement Act**	*(NO CHANGE)*
4.1.2	**SWRCB Water Rights Process and CALFED Bay-Delta Program**	*(NO CHANGE)*
4.1.3	**Deregulation of Electric Industry in California**	*(NO CHANGE)*
4.1.4	**Changes in Federal Farm Support Programs**	*(NO CHANGE)*
4.1.5	**Changes in Demand for Agricultural Products**	*(NO CHANGE)*
4.1.6	**Changes to Fisheries Management**	*(NO CHANGE)*
4.1.7	**Changes in Demand for Recreational Opportunities**	*(NO CHANGE)*
4.1.8	**Changes in Trinity River Basin Consumptive Water Use**	*(NO CHANGE)*
4.1.9	**Five Counties Coho Conservation Program**	*(NO CHANGE)*
4.1.10	**Total Maximum Daily Load (TMDL)**	*(NO CHANGE)*
4.1.11	**Lower Klamath Restoration Partnership**	*(NO CHANGE)*
4.1.12	**Changes in California Forest Practice Rules**	*(NO CHANGE)*

~~4.1.13 Tribal Water Quality Control Planning~~ **(CHANGES FOLLOW)**
pg. 4-11

~~Pursuant to Section 303(c) of the federal Clean Water Act, the EPA is authorized to delegate water quality authority to federally recognized Indian tribes. The Hoopa Valley Tribal Council (HVTC) has received 303(c) water quality authority from EPA, becoming the first tribe in California to receive such approval. The Yurok and Karuk Tribes have received Clean Water Act Section 106 grants from EPA to undertake baseline assessments, with the intent of developing water quality control plans and standards, which are expected to be completed in 2001.~~

~~In 1997, the HVTC approved and forwarded to the EPA a Water Quality Control Plan (WQCP), which included temperature objectives for protection of the anadromous fishery. The HVTC subsequently withdrew the Plan from EPA in 1999 to conduct a bi-annual review as required by the WQCP and the CWA. The HVTC is now in the process of revising its WQCP and standards to reflect the recent completion of the TRFE recommendation and other scientific findings related to heavy metals. In the event that the HVTC approves a~~

~~revised plan, it will submit it to EPA for final approval. Ultimate approval and implementation of tribal water quality control plans that include site- and time-specific temperature objectives protective of the anadromous fishery resources could provide an additional tool to provide the water quality necessary to help restore habitat and fish populations in the Trinity and Klamath Rivers.~~

4.1.14 Cumulative Impacts Analysis (CHANGES FOLLOW)
pg. 4-11

The simulation of the future cumulative condition includes consideration of:

- Projected increase in state-wide population growth and associated increase in demand for ~~CVP~~ water supplies in 2020, incorporating "probable future projects" (i.e., the No Action assumptions).
- Renewal of full contract amounts for all existing ~~All~~ CVP contractors and proposed contract amounts for new contracts provided under Section 206 of P.L. 101-514 per 3404(b) of CVPIA. ~~allocations identified in Table 4-1 are fully used (i.e., the full allocation identified for a given contract is in fact used, which as~~ These full contract amounts, shown ~~o~~in Table 4-1, ~~is~~ are in addition to what is assumed in the No Action ~~a~~Alternative~~, since such full allocation is not expected to occur by 2020)~~.
- Implementation of the CVPIA.

pgs. 4-11 and 4-12

Notably, the analysis of project impacts throughout this DEIS/EIR effectively addressed cumulative impacts by relying on models (e.g., PROSIM) that attempt to predict impacts in 2020, both of the Preferred Alternative (and other alternatives), as well as other placing demands on the CVP and SWP systems. ~~Although e~~Each chapter or subchapter of this EIS/EIR, in order to comply with CEQA, includes a section comparing the impacts of the Preferred Alternative to "existing conditions" in 1995 in order to ascertain what are commonly known as "project specific impacts," the remainder of the impact analysis compares the effects of various alternatives with "no action" (2020) conditions, which predict conditions in 2020 without the project.

pgs. 4-12 and 4-13

The following two paragraphs were one paragraph in the DEIS/EIR, but have been separated for sake of clarity.

Between 1995 and the year 2020, projected annual CVP M&I water service contracts and water rights demands are assumed to increase by approximately 320,000 af ~~north of the Delta~~. Annual SWP entitlements are projected to increase from 3.5-4.2 maf by the year 2020.

The cumulative impacts analysis includes the re-operation of the CVP in response to the ~~Trinity River DEIS/EIR~~ Preferred Alternative, and then adds the implementation of the following CVPIA measures and programs:

pg. 4-13

- Implementation of CVP re-operation and 3406(b)(2) water management for upstream and Delta actions similar to those defined in the November 20, 1997, Administrative

Paper released by Reclamation and the Service. (An additional analysis using the October 5, 1999, Decision on Implementation of Section 3406(b)(2) of the CVPIA is provided following the issue-specific cumulative impact analyses. The additional analysis was not provided in the DEIS/EIR because the DEIS/EIR was released prior to the finalization of the decision on implementation of Section 3406(b)(2).)

- Acquisition of up to 140,000 af/yr from willing sellers on the Stanislaus, Tuolumne, Merced, Calaveras, Mokelumne, and Yuba Rivers to meet instream and Delta fisheries needs. Acquired water may be exported from the Delta if conditions allow.
- Provision of firm Level 2 (typically the amount of water specific refuges received historically) refuge water supplies, including a 25 percent shortage provision in dry years based on the 40-30-30 Index (as described in the SWRCB 1995 Water Quality Control Plan).
- Acquisition of Level 4 (quantity of water specified in Interior reports assumed to allow for optimum management of each refuge specifically included in CVPIA refuge water supplies, including shortage criteria based on the reliability of the source from which the acquisition is made (Table 4-1).

~~In addition to these actions, the cumulative analysis also assumes that all CVP contracts allocations identified in Table 4-1 are fully used (i.e., the full allocation identified for a given contract is in fact used).~~

Additional analysis is presented in the FEIS/EIR to further clarify the cumulative impact assessment presented in the DEIS/EIR. The level of anticipated impact (i.e., significance) for all issue area discussions remains the same as in the DEIS/EIR.

pg. 4-25

The following new section has been added to Section 4.1.14 immediately following SWP Entitlement Water Deliveries:

Delta Surface-water Flows.

Impacts Relative to the No Action Alternative. Delta inflow is projected to decrease due to re-operation of the CVP in the cumulative condition analysis. In comparison to the No Action Alternative, average annual Delta inflow is projected to decrease by 380,000 af, or 2 percent over the period of record; 640,000 af, or 2 percent during the wet period; and 150,000 af, or 1 percent during the dry period. Average annual combined CVP and SWP Delta exports are projected to be reduced 170,000 af during the dry and wet periods, and 330,000 af, or 6 percent over the period of record. Average annual Delta outflow is projected to decrease by 40,000 af during the long-term average period; 470,000 af, or 2 percent during the wet period; and increase 60,000 af, or 1 percent during the dry period.

Impacts Relative to Existing Conditions. Delta operations are projected to change due to increased water demands and re-operation of the CVP at a 2020 level of development in the cumulative condition analysis. In comparison to the existing conditions, average annual Delta inflow is projected to decrease by 360,000 af, or 2 percent over the period of record; 600,000 af, or 2 percent during the wet period; and 170,000 af, or 1 percent during the dry period. Average annual combined CVP and SWP Delta exports are projected to be reduced

210,000 af during the dry period, but increase by 710,000 af during the wet period due to increased SWP demand south of the Delta. Combined exports increase 60,000 af, or 1 percent over the period of record. Average annual Delta outflow is projected to decrease by 450,000 af during the long-term average period; 1,350,000 af, or 6 percent during the wet period; and increase 60,000 af, or 1 percent during the dry period.

pgs. 4-25 and 4-26

Fishery Resources. Implementation of the Preferred Alternative is expected to result in a cumulatively beneficial impact in terms of increased anadromous fish production within the Trinity River Basin. As described in Chapter 3, this increase in fish production would result in beneficial recreational impacts, as well as increased economic benefits within the Trinity River Basin and Lower Klamath River Basin/Coastal Area. Modeled adverse impacts to anadromous fish within the Sacramento River would be expected to occur with regard to increased losses of early life-stages (eggs and sac-fry) of some runs of Sacramento River chinook salmon compared to the No Action Alternative, as well as existing conditions. These impacts are attributable to a slight anticipated mortality of chinook salmon eggs and sac-fry from increases of Sacramento River water temperature.~~ and would be significant~~

Trinity River Fisheries.

Impacts Relative to the No Action Alternative. Compared to the No Action Alternative, the implementation of the Preferred Alternative in relation to the cumulative condition would result in substantially restoring the diverse fish habitats necessary for the restoration and maintenance of anadromous fishery resources in the Trinity River Basin. The watershed protection component of the Preferred Alternative would accelerate and enhance habitat improvement and salmonid production through mechanical restoration. These improvements would be beneficial effects and substantially assist in the restoration of anadromous salmonid populations in the Trinity River. Increased populations would result in a greater number of fish being available for harvest.

The assumed increase in fish available for ocean commercial harvest would be a beneficial effect for the Northern/Central Oregon, KMZ-Oregon, KMZ-California, and Mendocino Regions.

Impacts Relative to Existing Conditions. Similar to the comparison to the No Action Alternative, the cumulative effects scenario would result in substantially restoring the diverse fish habitats necessary for the restoration and maintenance of anadromous fishery resources in the Trinity River Basin as compared to existing conditions. (As discussed in Section 3.5 Fishery Resources, while some habitat degradation is assumed to occur under the No Action condition, the majority of such degradation is assumed to have already occurred, and therefore, fishery habitats for existing conditions and the No Action Alternative are similar.) The watershed protection component of the Preferred Alternative would accelerate and enhance habitat improvements and salmonid production through mechanical restoration. Compared to existing conditions, these improvements would be beneficial effects and would substantially assist in the restoration of anadromous salmonid populations in the Trinity River. As discussed above, the increased availability of fish for ocean commercial harvest for the Northern/Central Oregon, KMZ-Oregon, KMZ-California, and Mendocino Regions would be a beneficial effect.

Sacramento River Fisheries.

Impacts Relative to the No Action Alternative. Implementation of the Preferred Alternative, the CVPIA Preferred Alternative, and full CVP water rights deliveries (cumulative effects) would result in modeled increased losses of early life stages (eggs and sac-fry) of some runs of Sacramento River chinook salmon compared to the No Action Alternative. These impacts are attributable to mortality of chinook salmon eggs and sac-fry from increases of upper Sacramento River water temperature. On an annual average basis, losses of fall and spring chinook salmon would increase approximately 1 percent over the No Action Alternative. These increases in mortality occurred throughout the simulation period of 1922-1990 due to increased water temperatures in the upper Sacramento River. Losses of late-fall chinook and steelhead would likely remain unchanged from No Action. Per NMFS' BO (2000), implementation of the Preferred Alternative is not likely to jeopardize Central Valley spring-run chinook salmon given implementation of reasonable and prudent measures specified in the BO.

Losses of winter chinook salmon eggs and fry would increase approximately 6 percent beyond that estimated for No Action. The modeled increases in mortality occurred during the critically dry waters years of 1924, 1931 through 1935, and 1977. For those years, increased water temperatures resulted in very large mortality increases (up to nearly 70 percent greater than those for No Action) of incubating and developing sac-fry. For the entire simulated period (1922-1990), the losses are slightly greater than assumed for the No Action condition, but they would be significant.

The cumulative effects of the implementation of preferred alternatives and full CVP deliveries on Delta species would likely be minor compared to No Action. The average absolute change in the position of X2 (in km) in the Delta during February through June would be less than 1.7 km, a relative change of less than 3 percent. These changes in geographic position of X2 may not be sufficiently large as to affect transport of larvae and juveniles into areas in the Delta where they could be entrained into the Delta pumps. However, reductions in outflows greater than 10 percent less than the No Action Alternative during the months of February through June occurred in up to 14 percent of the years modeled. These reductions may result in adverse effects to Delta smelt and other native or important sport fish in the Delta, and would be considered a significant impact. ~~in the Delta in comparison to the No-Action, and existing conditions scenario may adversely affect Delta species by relocating them in less productive or areas of lower habitat value within the Delta. These changes would be considered significant.~~

Impacts Relative to Existing Conditions. Implementation of the Preferred Alternative, the CVPIA Preferred Alternative, and full CVP water rights deliveries (cumulative effects) would result in even greater losses of early life stages (eggs and sac-fry) of fall, winter, and spring chinook salmon compared to existing conditions. This would result from increased water temperatures in the upper Sacramento River. Losses of late-fall chinook and steelhead would likely remain unchanged from No Action. On an annual average basis, losses of fall, winter, and spring chinook salmon would increase approximately 2, 6, and 4 percent, respectively, over those under existing conditions. These losses would be significant.

The cumulative effects of the implementation of the Preferred Alternative and full CVP deliveries on Delta species would also be minor compared to No Action. The average absolute change in the position of X2 (in km) in the Delta during February through June would be less than 1.6 km, a relative change of approximately 2 percent. These changes are likely not sufficient in magnitude to result in adverse effects to Delta smelt and other native or important sport fish in the Delta. The changes in the positions of X2 would not be large enough to transport larvae and juvenile smelt and other species into areas where they would be subject to increased entrainment or less suitable habitats. Reductions in outflows in the Delta during the months of February through June may result in adverse impacts to Delta species. These impacts are considered potentially significant.

pg. 4-26

The following new section has been added to Section 4.1.14 immediately before Agricultural Land Use:

M&I Land Use. Surface-water deliveries to municipal water service contractors north and south of the Delta could be influenced by future demands for water as well as CVP and SWP operational limitations in meeting other needs.

Impacts Relative to the No Action Alternative. Average M&I surface-water delivery is estimated to decrease by 6,800 af in the Sacramento Valley Region. Groundwater, other local supplies, and a small amount of price-induced conservation are projected to be used to eliminate this shortfall at a cost of $1.1 to $1.9 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries would be reduced by 15,800 af compared to the No Action Alternative. Some of the resulting shortage is projected to be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The costs of drought conservation would increase about $3.6 million annually compared to the No Action Alternative[20].

In the Bay Area, average M&I surface-water delivery is estimated to decrease by 17,200 af. Conservation, reclamation, and a small amount of price-induced conservation (i.e., conservation resulting from an increase in the retail price) are assumed to be used to eliminate this shortfall at a cost of $2.7 to $4.5 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries would be reduced by 41,100 af compared to the No Action Alternative. Some of the resulting shortage would be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought water supplies would be acquired to eliminate the remaining shortage. The costs of these dry-condition supplies would increase about $44 to $76 million annually compared to the No Action Alternative.

In the San Joaquin Valley, average M&I surface-water delivery is estimated to decrease by 2,100 af. Groundwater, other local supplies, and a small amount of price-induced conservation are assumed to be used to eliminate this shortfall at a cost of $0.3 to $0.7 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries are projected to be reduced by

[20] Dry-condition costs are in addition to the average-condition costs and occur only in dry years (1928 through 1934, or about once every 5 years on average).

2,900 af compared to the No Action Alternative. Some of the resulting shortage would be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The costs of drought conservation would increase about $0.2 million annually compared to the No Action Alternative.

Impacts Relative to Existing Conditions. Average surface-water delivery for municipal use is estimated to increase by 18,600 af in the Sacramento Valley Region. Average-condition shortfall is projected to increase from zero to 10,100 af. The shortfall occurs because the increase in surface-water delivery is not enough to meet increased demand in 2020 in affected service areas. Groundwater, other local supplies, and a small amount of price-induced conservation is assumed to be used to eliminate this shortfall at a cost of $1.7 to $2.7 million annually. The average retail price increase needed to cover these costs would be more than 1 percent on average, which is significant. However, as evidenced above in the comparison of the cumulative condition to No Action, the majority of gap between supply and demand is associated with assumed increased population growth. In the dry condition, CVP contract deliveries would be increased by 2,200 af compared to existing conditions, but shortage would increase by 11,900 af. Some of the resulting shortage would be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The costs of drought conservation would increase about $0.8 million annually compared to existing conditions.

In the Bay Area, average surface-water delivery is estimated to increase by 5,200 af. Average-condition shortfall is projected to increase from zero to 8,400 af. The shortfall is projected to occur because the increase in surface-water delivery is not enough to meet 2020 demand in affected service areas. Conservation, reclamation, and a small amount of price-induced conservation would be used to eliminate this shortfall at a cost of $3.9 to $6.5 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries are projected to be reduced by 36,100 af compared to existing conditions. Some of the resulting shortage is assumed to be eliminated using the water acquired for the average condition. It is assumed that drought water supplies would be acquired to eliminate the remaining shortage. The cost of dry-condition supplies would increase about $78 to $198 million annually compared to existing conditions.

In the San Joaquin Valley, average surface-water delivery is estimated to increase by 900 af. Average-condition shortfall is projected to increase from zero to 2,400 af. The shortfall is projected to occur because the increase in surface-water delivery is not enough to meet 2020 demand in affected service areas. Groundwater, other local supplies, and a small amount of price-induced conservation are assumed to be used to eliminate this shortfall at a cost of $0.4 to $0.8 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries are projected to be increased by 100 af compared to existing conditions. Some of the resulting shortage is assumed to be eliminated using water acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The costs of drought conservation would increase about $0.8 million annually compared to the existing conditions.

Impacts Relative to the No Action Alternative.
pg. 4-29

Additional land retirement is expected to be implemented in SWP service areas within Kings and Kern Counties. In areas not implementing land retirement, changes in surface-water supply are assumed to be largely matched by regional changes in groundwater pumping. Irrigated acreage reductions would be more pronounced in areas with limited usable groundwater. In the San Felipe Unit, irrigated acres would decline by approximately 9,000, with an average gross revenue reduction of about $32 million per year. This reduction in irrigated acreage represents a significant decrease of almost 38 percent within the subregion and would result in a substantial impact on the agricultural economy of the San Felipe Unit.

pg. 4-31

~~**Water Quality.** As described in Section 3.4, Water Quality, Trinity River instream temperatures associated with Lewiston releases are identified as improving compared to the No Action and Existing Conditions scenarios. This is in part due to shifting exports to the summer and fall months decrease the potential for warming of water within Lewiston. Under the cumulative scenario, Trinity Reservoir temperatures are assumed to degrade below No Action levels, primarily in normal and dry conditions as a result of greater future CVP demands driving the need to decrease Trinity Reservoir carryover storage. This would be a significant impact with regard to Trinity River temperatures.~~

~~Modeled water temperature impacts within the Sacramento River are modeled to be slightly greater than what is anticipated for the Preferred Alternative. Associated temperature-related impacts to fisheries are discussed previously under Fishery Resources.~~

Trinity River Temperature. The cumulative impacts analysis presents the results of Trinity Division temperature model simulations under two versions of the cumulative condition: one that maintains a minimum carryover storage level of 600 taf in Trinity Reservoir (“cumulative (600 taf)”), and a second that maintains carryover storage of 400 taf (“cumulative (400 taf)”). To evaluate compliance with NCRWQCB standards, results of the SNTEMP model are presented as percentage of days that instream temperatures violate Trinity River temperature objectives under median year hydro-meteorological conditions (see Table 3-8 of Section 3.4). The median-year evaluation criteria were developed by the Service for use with the SNTEMP model for the period July 1 through October 15, as presented in Table 3-7. For each alternative, simulations were performed for five specific years (1983, 1986, 1989, 1990, and 1977) representing five different water-year classes (extremely wet, wet, normal, dry, and critically dry), as outlined in Section 3.4 Water Quality. Evaluation of the Hoopa EPA temperature criteria relied upon actual hydro-meteorological conditions of the representative years modeled using BETTER. These years included 1977 (critically dry), 1990 (dry), 1989 (normal), 1986 (wet), and 1983 (extremely wet). This evaluation provided estimates of the percentage of weeks the objectives would be met, as outlined in Section 3.4 Water Quality.

Impacts Relative to the No Action Alternative. In four of the five years analyzed, the cumulative (600 taf) either had the same NCRWQCB compliance as No Action or improved compliance. In the normal water year, cumulative (600 taf) decreased compliance by

6.5 percent (105 days of temperature compliance versus 98 days under cumulative (600 taf)). In the extremely wet and wet water years, cumulative (600 taf) achieves the same compliance as No Action (100 percent compliance). In the dry and critically dry water years, cumulative (600 taf) has 12.1 percent and 68.2 percent better compliance than No Action, respectively (94 days of compliance versus 81 days for dry; 97 days versus 24 days for critically dry). For the Hoopa EPA standards, cumulative (600 taf) improved compliance in four of the five years analyzed. In the extremely wet water year, compliance was the same as the No Action Alternative (100 percent).

In three of the five years analyzed, the cumulative (400 taf) either had the same compliance as No Action or improved compliance. In the normal and dry water years, cumulative (400 taf) decreased compliance by 27.1 percent and 16.8 percent, respectively (105 days of temperature compliance versus 76 days under cumulative (400 taf) for the normal water year; 81 days versus 63 days for the dry water year). In the extremely wet and wet water years, cumulative (400 taf) achieves the same compliance as No Action (100 percent compliance). In the critically dry water year, cumulative (400 taf) has 6.5 percent better compliance than No Action (31 days versus 24 days). For the Hoopa EPA standards, cumulative (400 taf) improved compliance in three of the five years analyzed. In the critically dry and extremely wet water year, compliance was the same as the No Action Alternative (88 percent and 100 percent, respectively.

Reasons for the differences in compliance with temperature objectives between these alternatives are due to the changes in the timing and rate of CVP diversions; cooler water temperatures in Lewiston Reservoir typically result from higher CVP diversion rates (i.e., high flow through Lewiston Reservoir). Historically, temperatures in Lewiston Reservoir have been highly variable because of intermittent operation of the Carr Powerplant. When operating at full capacity, the plant draws about 3,200 cfs through the intake. This rate of flow through Lewiston Reservoir is sufficient to displace its entire volume in only 2.5 days. During summer, high through-flow prevents the formation of a warm surface layer and results in fairly uniform water temperature, usually around 47°F. When the Carr Powerplant is not operating, thermal stratification develops within a few days, and surface summer temperatures can warm to between 60°F and 70°F. Dry-year class operations that divert most of the water to the CVP during the spring months also tend to drain Trinity Reservoir by early summer. The resultant low summer storage in Trinity Reservoir may allow the reservoir’s thermocline to intersect the dam outlet intake structure. This adverse effect of low summer storage in Trinity Reservoir can be seen as a drop in compliance with downstream temperature objectives when the Preferred Alternative is operated at a lower minimum reservoir storage (400 taf versus 600 taf). Both cumulative scenarios improve compliance with the Hoopa EPA standards compared to No Action. This is largely a result of the higher instream flows assumed under both cumulative scenarios.

Impacts Relative to Existing Conditions. In three of the five years analyzed, the cumulative (600 taf) either had the same compliance as existing conditions or improved compliance. In the normal and dry water years, cumulative (600 taf) decreased compliance by 5.6 percent and 12.1 percent, respectively (104 days of temperature compliance versus 98 days under cumulative (600 taf) for the normal water year; 107 days versus 94 days for the dry water year). In the extremely wet and wet water years, cumulative (600 taf) achieves the same compliance as existing conditions (100 percent compliance). In the critically dry water year,

cumulative (600 taf) has 74.8 percent better compliance than existing conditions (17 days versus 97 days). For the Hoopa EPA standards, cumulative (600 taf) improved compliance in four of the five years analyzed. In the extremely wet water year, compliance was the same as existing conditions (100 percent).

In three of the five years analyzed, the cumulative (400 taf) either had the same compliance as existing conditions or improved compliance. In the normal and dry water years, cumulative (400 taf) decreased compliance by 26.2 percent and 41.1 percent (104 days of temperature compliance versus 76 days under cumulative (400 taf) for the normal water year; 107 days versus 63 days for the dry water year). In the extremely wet and wet water years, cumulative (400 taf) achieves the same compliance as existing conditions (100 percent compliance). In the critically dry water year, cumulative (400 taf) has 13.1 percent better compliance than existing conditions (17 days versus 31 days). For the Hoopa EPA standards, cumulative (400 taf) improved compliance in three of the five years analyzed. In the critically dry and extremely wet water year, compliance was the same as existing conditions (88 percent and 100 percent, respectively).

Reasons for the differences in compliance with temperature objectives between these alternatives are the same as those listed for the comparison with No Action.

Sacramento River Temperature. The following analysis is based on temperature criteria established in the Sacramento River Biological Opinion (1993) for the protection of Sacramento River winter chinook salmon and described in Section 3.4 Water Quality.

Impacts Relative to the No Action Alternative. Model results for the cumulative condition indicated that on average, overall temperature violations from April through October would increase approximately 4 percent from 15.9 percent to 19.9 percent. For individual months, the largest increases in violations over those that were projected to occur under the No Action Alternative occurred during the months of May through June, with violations increasing up to 10 percent (June). Conversely, the model indicates that the Cumulative Impacts scenario would result in 6 percent fewer violations during April when compared to No Action Alternative.

Modeling based on dry-period data revealed, on average, that the number of temperature violations from April through October under the Cumulative Impacts scenario increased approximately 5 percent when compared to the No Action Alternative. During the dry period, approximately 39 percent and 45 percent of the months from April through October would result in violations of the Biological Opinion temperature criteria for No Action and Cumulative Impacts, respectively. Generally, the magnitude of temperature violations is greater under the cumulative condition than under No Action. This is reflected in increased winter-run mortality in dry years. Please see Sacramento River Fisheries for a discussion of cumulative effects on salmon mortality.

Cumulative Impacts during the wet period resulted in a decrease in the number of temperature violations during the months of April through October when compared to the No Action Alternative. For the No Action Alternative, Biological Opinion temperature criteria violations would occur on average, in approximately 20 percent of the months from April through October. This is compared to violations occurring in approximately 9 percent of the months from April through October for the Cumulative Impacts scenario.

Impacts Relative to Existing Conditions. Modeling of long-term temperature data indicated that the Cumulative Impacts scenario would result in an approximate 6 percent increase in the number of months when the Sacramento River Biological Opinion temperature criteria for winter chinook salmon would be violated when compared to existing conditions. Overall, the percentage of months from April through October with temperature violations would increase from approximately 14 percent to 20 percent. The largest increases in violations under the Cumulative Impacts scenario would occur during the months of May through September and would increase up to approximately 12 percent more violations (July) than the No Action Alternative. Conversely, in April there would be approximately 6-percent fewer violations than that for the No Action Alternative.

For the dry period, on the average and compared to existing conditions, the number of temperature violations during the months of April through October was projected to increase approximately 8 percent for the Cumulative Impacts scenario. For existing conditions, during the dry period, approximately 37 percent of the months from April through October would result in violations of the Biological Opinion temperature criteria. For the Cumulative Impacts scenario, this would increase to approximately 45 percent. For individual months, the greatest increase in the number of monthly temperature violations would occur in April (approximately 29 percent), and the largest decrease in the number of monthly temperature violations would occur in October (approximately 29 percent). Generally, the magnitude of temperature violations is greater under the cumulative condition than under existing conditions. This is reflected in increased winter-run mortality in dry years. Please see Sacramento River Fisheries for a discussion of cumulative effects on salmon mortality.

For the wet period, on the average and compared to existing conditions, the number of temperature violations during the months of April through October were approximately 11 percent fewer for the Cumulative Impacts scenario. For existing conditions, approximately 20 percent of the months from April through October would result in violations of the Biological Opinion temperature criteria. This is compared to approximately 9 percent of the months from April through October for the Cumulative Impacts scenario which would violate the Biological Opinion temperature criteria. For individual months, the greatest decrease in the number of monthly temperature violations would occur during June through September (approximately 20 percent), and there were no months when there were more monthly temperature violations than that for the existing conditions scenario.

Bay-Delta Drinking Water Quality.

Impacts Relative to the No Action Alternative. The DSM2 Delta water quality results projected varying increases and decreases in average monthly EC, bromide, and DOC concentrations throughout the year at Contra Costa Canal Intake, Old River at Highway 4, Delta-Mendota Canal Intake, and Clifton Court Forebay.

The greatest potential for increase is at Old River near Highway 4, where EC and bromide concentrations are estimated to increase up to 50 and 80 percent in December and January due to closures of the Cross Channel Gate as part of the Delta 3406(b)(2) actions assumed to be implemented under CVPIA. Impacts of this magnitude would not be expected to occur in actual operations since the Cross Channel Gate would be re-opened if monitored EC concentrations approach threshold levels as defined in the 1997 CALFED Operations Group

Sacramento River Spring-Run Chinook Salmon Protection Plan. The decision to re-open the gates would be made on a real-time basis.

Modeled EC and bromide concentrations at the Delta-Mendota Canal Intake were projected to increase up to 24 percent under average and critical dry conditions in the high export months of June and July. DOC concentrations at the Contra Costa Canal Intake, Old River at Highway 4, Delta-Mendota Canal Intake, and Clifton Court Forebay rise up to 16 percent under average conditions and 12 percent in critical dry years in the months of April through July, due to reduced CVP and SWP exports. Greens Landing and North Bay Aqueduct concentrations are similar to the No Action Alternative for the three constituents. These potential changes in Delta water quality would be significant impacts.

Impacts Relative to the Existing Conditions. As is the case for the No Action comparison, the DSM2 Delta water quality results show varying increases and decreases in average monthly EC, bromide, and DOC concentrations throughout the year at Contra Costa Canal Intake, Old River at Highway 4, Delta Mendota Canal Intake, and Clifton Court Forebay.

Modeled EC and bromide concentrations at Old River near Highway 4 are projected to increase up to 60 and 100 percent in December and January due to closures of the Cross Channel Gate as part of the Delta 3406(b)(2) actions implemented under CVPIA. As with the No Action analysis, impacts of this magnitude would not be expected to occur in actual operations since the Cross Channel Gate would be re-opened if monitored EC concentrations approach threshold levels as defined in the 1997 CALFED Operations Group Sacramento River Spring-Run Chinook Salmon Protection Plan.

EC and bromide concentrations at the Delta-Mendota Canal Intake increase up to 35 and 25 percent under average and critical dry conditions in the high export months of June and July. DOC concentrations at the Contra Costa Canal Intake, Old River at Highway 4, Delta-Mendota Canal Intake, and Clifton Court Forebay rise up to 10 percent under average conditions and 13 percent in critical dry years in the months of April through July, due to reduced CVP and SWP exports. Greens Landing and North Bay Aqueduct concentrations are similar to the No Action Alternative for the three constituents. These potential changes in Delta water quality would be significant impacts.

Power Resources. As described in Section 3.10, Power Resources, and above under Section 4.1.3, the Preferred Alternative would reduce available CVP hydropower generation annually and in peak power demand periods (i.e., summer months). If this power is not available for use by Western preference power customers, the customers or Western would need to purchase power from other sources. ~~Therefore, the cost of power for all users would probably increase due to market forces. Significant cumulative impacts (primarily air quality impacts) could occur if these reductions in power supplies induced increased generation from either existing gas-fired generators or the construction of new facilities. Such impacts are anticipated to be further exacerbated under the cumulative condition. The overall cumulative impact from the Preferred Alternative and probable future projects is therefore considered potentially significant. In addition, the Preferred Alternative's incremental contribution to this condition is considered to be cumulatively considerable.~~

Two important changes to water operations occur under the cumulative condition, both of which affect the value of power resources. First, the minimum carryover storage at Trinity

Reservoir is reduced from 600 taf to 400 taf, which has a direct effect on the capacity provided by the Trinity Powerplant, reducing its value as a peaking resource. Although the reduction in carryover storage only occurs in the worst-case scenario, for the purposes of power valuation, this reduction in firm capacity would be substantial. Generally, the cumulative run reduced reservoir levels across the CVP, with corresponding reductions in capacity. However, the reduction at Trinity was especially notable in terms of impacts to CVP preference customers because the reduced capacity occurred specifically in dry years, when capacity is especially valuable. Secondly, exports were shifted back towards the spring months under the cumulative scenario in order to alleviate temperature concerns in the Sacramento River. This shift reduces the value of TRD generation by moving it from the higher-value summer months to the lower-value spring months. These changes are important to consider in relation to the Preferred Alternative, where a reduction in generation was offset by an increase of value. For the cumulative condition, a decrease in generation (compared to No Action) is compounded by a reduction in value.

Impacts Relative to the No Action Alternative. Compared to the No Action Alternative, energy production is reduced in the cumulative condition by approximately 8 percent. This decrease reduces the value of energy compared to No Action because generation under the cumulative condition occurs less often in the higher-value summer season. The majority of the generation under the cumulative condition occurs in the lower-value spring season. Average monthly capacity is reduced by approximately 3 percent. However, reductions in firm capacity (capacity supported by energy) account for a substantial decrease in value. These two factors; shift in timing of generation, and reduction in dry year firm capacity, account for the majority of the reduction in value under the cumulative condition compared to the No Action condition. The cumulative condition would reduce the value of CVP power resources by $9,975,000 per year compared to the No Action Alternative. The reduction in value is considered significant.

Impacts Relative to Existing Conditions. The characteristics of Power Resources under existing conditions are similar to those under the No Action Alternative. However, under existing conditions electrical power and energy are jointly managed with PG&E as per Contract 2948-A. The No Action Alternative assumes that this contract is not renewed. While this assumption does not have a major effect on the value of electricity generated, under No Action, electricity generation better matches preference power customer loads. Similar to the comparison to No Action, the reduction in value under the cumulative condition compared to existing condition is considered significant.

pg. 4-32

The following new section has been added to Section 4.1.14 immediately following Mitigation (new Table 4-3A and Figures 4-6 and 4-7 are included in Section 2.3 Changes to the DEIS/EIR Tables and Figures):

Reclamation Analysis of Preferred Alternative and October 5, 1999, Decision on Implementation of 3406(b)(2). Subsequent to the cumulative impact analysis conducted for the DEIS/EIS, Reclamation conducted a PROSIM analysis of the impacts of regulatory actions on CVP and SWP water supplies related to the Preferred Alternative and DOI's interpretation of 3406(b)2 water management as defined in the October 5, 1999, Decision on Implementation of Section 3406(b)(2) of the CVPIA. The study was conducted at a 1995

level of development using the hydrologic period from 1983 through 1993. Hydrologic conditions during this 11-year period range from critically dry to wet.

PROSIM simulations were conducted for four conditions representing increasing levels of regulatory actions. The four simulations included a pre-CVPIA 1995 water quality control plan (Bay-Delta WQCP), 3406(b)(2), and Preferred Alternative conditions. The conditions are additive, in that the 3406(b)(2) condition includes the Bay-Delta WQCP condition, and the Preferred Alternative includes both the Bay-Delta WQCP and 3406(b)(2) conditions. The Bay-Delta WQCP simulation represents conditions that are generally similar to the DEIS/EIR existing conditions. The Preferred Alternative simulation represents conditions that are generally similar to the cumulative impact analysis. The specific assumptions associated with each of the simulations are summarized in Table 4-3A.

The model results for the Preferred Alternative show an average annual allocation of 45 percent of full allocation for north of Delta CVP agricultural and 76 percent for northern M&I water service contractors, compared to 60 percent and 84 percent for the Bay-Delta WQCP condition, respectively. The majority of the decrease in allocations for the agricultural water service contractors is related to the implementation of 3406(b)(2). South of the Delta, agricultural water service contractor average annual allocations would be 36 percent compared to 63 percent for the Bay-Delta WQCP condition, and 74 percent compared to 86 percent for the M&I contractors. Again, the majority of the incremental decrease in allocations between the Bay-Delta WQCP and Preferred Alternative is related to the implementation of Section 3406(b)(2). SWP deliveries south of the Delta were the same between the Preferred Alternative and Bay-Delta WQCP simulations. Figures 4-6 and 4-7 show the comparison of average annual deliveries north and south of the Delta. As also shown on Figures 4-6 and 4-7, CVP deliveries to Sacramento River Settlement Contractors, San Joaquin River Exchange Contractors, and refuges are not affected by b(2) water management or the Preferred Alternative.

Although these results differ from the analyses conducted for the DEIS/EIR (due to differences in level of development and hydrologic period), they are consistent in that both sets of results show substantial reductions in CVP deliveries south of the Delta due to reduced available water supply and b(2) water management export restrictions.

4.2 Growth-inducing Impacts *(NO CHANGE)*

4.3 Irreversible and Irretrievable Commitments of Resources and Significant Impacts that Would Remain Unavoidable Even after Mitigation *(NO CHANGE)*

4.4 Short-term Uses of the Environment Versus Long-term Productivity *(NO CHANGE)*

4.5 Environmental Commitments and Mitigation and Significant Unavoidable Impacts **(CHANGES FOLLOW)**

pg. 4-38

Table 4-4 has been revised to include Hoopa Valley Tribe temperature objectives and mitigation. See Section 2.3 Changes to the DEIS/EIR Tables and Figures for revised Figure 4-4.

5.0 Consultation and Coordination *(SEE SUBSECTIONS)*

5.1 Lead and Participating Agencies *(SEE SUBSECTIONS)*

5.1.1 Applicable Laws, Policies, and Programs **(CHANGES FOLLOW)**

pgs. 5-4 and 5-5

California Environmental Quality Act. This document was prepared to comply with CEQA, based on the Trinity County's determination that the proposed action constitutes a "project" under CEQA (CEQA Guidelines Section 15378[a]). CEQA and NEPA are similar in many ways in terms of the identification of alternatives, potential mitigation measures, and adverse environmental impacts that cannot be avoided (see Chapter 1). This joint NEPA/CEQA document is meant to comply with both laws so as to reduce redundancy while providing the necessary documentation for both processes. Key among the CEQA provisions is the requirement to identify all significant impacts. Significance thresholds are identified for each issue area to allow the reader to clearly see at what point a given environmental impact was considered significant. For more information on CEQA, see Chapter 1 ~~and Technical Appendix G~~.

pgs. 5-5 and 5-6

Fish and Wildlife Coordination Act. The FWCA requires consultation with the Service and the fish and wildlife agencies of states when any water body is impounded, diverted, controlled, or modified for any purpose by any agency under a federal permit or license. The Service and state agencies charged with managing fish and wildlife resources are to conduct surveys and investigations to determine the potential damage to fish and wildlife and the mitigation measure to be taken. The Service may incorporate the concerns and findings of state agencies and other federal agencies.~~ Compliance with the FWCA will be coordinated with consultation for ESA, as described above.~~ By virtue of joint administration of the NEPA/CEQA process and joint development of the DEIS/EIR and FEIS/EIR, the federal and state consultation requirements of this act have been satisfied.

pg. 5-6

National Historic Preservation Act. Section 106 of the NHPA requires that federal agencies evaluate the effects of federal undertakings on historical, archeological, and cultural resources and afford the Advisory Council on Historic Preservation (ACHP) the opportunity to comment on the proposed undertaking. The first step in the process is to identify cultural resources included on (or eligible for inclusion on) the NRHP that are located in or near the project area. The second step is to identify the possible effects of proposed actions. The lead agency must examine whether feasible alternatives exist that would avoid such effects. The lead agencies have consulted under Section 106 of the National Historic Preservation Act with the appropriate tribes, Tribal Historic Preservation Office, and State Historic Preservation Office. Section 106 compliance in the form of a Programmatic Agreement will be executed prior to the execution of the ROD. Procedures and conditions contained in the Programmatic Agreement also satisfy the archaeological resources protection provisions of the Antiquities Act of 1906, the Reservoir Salvage Act of 1960, the Archaeological and Historic Preservation Act of 1974, and the Archaeological Resources Protection Act of 1979. ~~Compliance with the NHPA is discussed in Section 3.12.~~

pgs. 5-7 and 5-8

Wild and Scenic Rivers Act. The Wild and Scenic Rivers Act designates qualifying free-flowing river segments as wild, scenic, or recreational. The act establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory. The Trinity River was designated a Wild and Scenic River due in part to its "outstandingly remarkable resource," the fishery (46 FR 7484). Implementation of the Preferred Alternative must be demonstrated to be consistent with this Act, under which it is the "policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. Therefore, ~~U~~under the act, a federal agency may not assist the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a wild or scenic river. If the project would affect the free-flowing characteristics of a designated river or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area, such activities should be undertaken in a manner that would minimize adverse impacts, and should be developed in consultation with the NPS. ~~The Trinity River was designated a Wild and Scenic River due in part to its "outstandingly remarkable resource," the fishery (P.L. 90-542).~~ Impacts to the Trinity River are discussed in light of the designation and the Act. Final determinations of consistency must be made by those federal agencies responsible (NPS, BLM, and USFS) for the management of various segments of the Trinity River within the National Wild and Scenic River system. Wild and Scenic Rivers Act compliance will be documented prior to execution of the ROD.

pg. 5-8

The following new text has been added to the end of Section 5.1.1:

Clean Air Act (42 U.S.C. 7401) and Amendments of 1977. The majority of the amendments to the Clean Air Act were enacted in 1977 and are known as the Clean Air Amendments of 1977 (P.L. 95-95; 91 Stat. 685). The primary objective of the Clean Air Act is to establish federal standards for various pollutants from both stationary and mobile sources, and to provide for the regulation of polluting emissions via state implementation plans. In addition, the amendments are designed to prevent significant deterioration in certain areas where air quality exceeds national standards, and to provide for improved air quality in areas that do not meet federal standards ("nonattainment" areas). The Trinity River Basin lies within the North Coast Air Basin (NCAB), which is under the jurisdiction of the North Coast Unified Air Quality Management District (NCUAQMD). The air quality of the Trinity River Basin meets the national Ambient Air Quality Standards (AAQS) for all criteria pollutants. However, it is designated non-atttainment by the state with respect to PM_{10} in the Weaverville area during winter months, due to residential wood heating.

Site-specific environmental reviews would be conducted for all non-flow activities, e.g., channel rehabilitation projects, watershed protection projects, and spawning gravel placement. However, air quality impacts resulting from implementation of any of the

alternatives would be de minimus (see Mitigation on page 3-424 of the DEIS/EIR) and thus consistent with this Act.

Coastal Zone Management Act of 1972, as amended (16 U.S.C 1451-1464, chapter 33; P.L. 92-583). Coastal Zone Management Act of 1972, as amended, established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. Consistent with the provisions of this act, the State of California's coastal plan has defined boundaries of the coastal zone, identified uses of the area to be regulated by the state, the mechanism (criteria, standards, or regulations) for controlling such uses, and broad guidelines for priorities of uses within the coastal zone. None of the alternatives would result in changes in land use within the Coastal Zone; thus, the proposed action is consistent with this act.

Farmland Protection Policy Act of 1981 (7 U.S.C. 420). The Farmland Protection Act requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. The U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) administers this act to preserve farmland. Consistent with this act, the lead agencies have identified actions that may affect agricultural lands in the DEIS/EIR and FEIS/EIR.

Federal Water Pollution Control Act (Clean Water Act) (33 U.S.C. 1251 et seq.)(Section 404 and Section 401 Water Quality Certification programs). Section 404 authorizes the Corps to issue permits for the discharge of dredged or fill material into navigable waters at specified disposal sites (33 U.S.C. 1344). EPA is authorized to prohibit the use of a site as a disposal site based on a determination that discharges would have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas, wildlife, or recreational uses. Applicants for federal permits or licenses for activities involving discharges into navigable waters are to provide a state certification that the proposed activity would not violate applicable water quality standards (33 U.S.C. 1341). Licenses and permits may not be granted if the state or interstate certification has been denied. Permits under Sections 401 and 404 are not required prior to the Secretary making a decision; however, permits would be required under Sections 401 and 404 if mechanical restoration projects were part of the program adopted under the Secretary's decision (actual implementation of the project would undergo a site-specific environmental review).

Federal Water Project Recreation Act (P.L. 89-72). This act recognizes recreation as a purpose in water development projects and states that federal agencies must consider potential outdoor recreational opportunities and potential fish and wildlife enhancement when planning navigation, flood control, reclamation, hydroelectric, or multi-purpose water resource projects. While the proposed project is not intended to develop new water, the Preferred Alternative would result in a modification of a Reclamation project that incorporates a substantial recreation component. As described in this DEIS/EIR, implementation of the Preferred Alternative would not adversely affect recreational activities on the river or at reservoirs.

Noise Control Act of 1972; Noise Pollution Abatement Act of 1970 (P.L. 91-604). It is not anticipated that project implementation would result in excessive noise because very few sensitive receptors are located within the project area. However, consistent with these acts, the lead agencies would comply with any state, interstate, and local requirements respecting

control and abatement of environmental noise to the same extent that any person is subject to such requirements.

Porter-Cologne Water Quality Control Act. Together, the federal Clean Water Act (33 U.S.C. § 1251 et. seq.) (CWA) and the state Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.) (Porter-Cologne) regulate water quality in California's water bodies, including the Trinity River, the Sacramento River, and the Sacramento-San Joaquin Delta. The CWA sets a broad legal framework for protecting water quality throughout the nation, but gives states the opportunity to operate their own regulatory programs, provided that the resulting water quality control is sufficiently stringent to meet or exceed federal criteria. The Porter-Cologne Act and its programs serve this function within California. Porter-Cologne requires each of the state's nine Regional Water Quality Control Boards to adopt "basin plans" for areas within the affected region. (Wat. Code, § 13240.) These plans contain "water quality objectives" that, when approved by SWRCB and EPA, function as "water quality standards" under the CWA. Although water quality objectives typically regulate ambient waters and most frequently focus on traditional pollutants such as heavy metals, they also regulate permissible saline levels and turbidity, and set water temperatures needed to protect fisheries and other aquatic resources. In both the Trinity and Sacramento Rivers, the maintenance of temperature objectives is very important to the protection of fisheries.

To achieve and maintain water quality objectives, regional boards issue "waste discharge requirements" (WDRs) limiting pollutants levels in discharges to water bodies (Wat. Code, § 13260 et seq.). These WDRs are the equivalent of, and function as, National Pollutant Discharge Elimination System (NPDES) permits required by the CWA.

Compliance with the Porter-Cologne Water Quality Control Act and all applicable permits are discussed in Section 3.4 Water Quality.

Caltrans Encroachment Permits. California Streets and Highway Code Sections 670 through 675 authorize the California Department of Transportation (Caltrans) to issue permits allowing various kinds of alterations to state highways. Among the possible alterations are the making of openings or excavations, or the placing, changing, or renewing of "encroachment[s]." Through the issuance of such permits, Caltrans can allow the owner or developer of property adjacent to a highway to construct, alter, repair, or improve any portion of the highway for the purpose of improving local traffic access. In granting such permits, Caltrans has authority to require a permitee to fund the costs of the necessary improvements, and to ensure that the work at issue will not leave the highway worse off from either a physical or a safety standpoint. It is possible that channel restoration projects envisioned under various alternatives would create the need to obtain new points access to State Highways 3 or 299.

Trinity County Encroachment Permits. Section 12.04.010 of the Trinity County Code authorizes the Trinity County Transportation Department to require encroachment permits for new points of access to county roads or other activities that might damage the surface of county roads. Section 12.04.020 of the County Code allows the County to require as a permit condition that the county road be left in as good condition as it was before any change was made. Section 12.04.030 of the County Code allows the permit to be conditioned to require a bond or cash deposit to ensure that the permit conditions are met.

Watershed restoration projects associated with county roads would undergo environmental review through the Trinity or Humboldt County Planning Departments and may require encroachment permits if an entity other than the Counties (Resource Conservation District, etc.) would be performing the work.

Surface Mining Control and Reclamation Act. The Surface Mining and Reclamation Act (Pub. Resources Code, § 2710 et seq.) (SMARA) embodies a comprehensive scheme regulating surface mining and mandating reclamation in California. SMARA generally requires that, except for those in place before 1976, mining operations must obtain use permits regulating the manner in which mining can occur. In addition, both old and new operations must obtain reclamation plans governing how mined lands will be eventually restored. Regulations implementing SMARA are promulgated by the State Mining and Geology Board (See Cal. Code Regs., tit. 14, § 3500 et seq).

Although the Flow Decision does not directly implicate SMARA, it is possible that the spawning gravel needed for placement below Lewiston Dam may create a demand for newly permitted gravel mining operations. Any such operations would be subject to their own environmental review process under CEQA, and thus need not be covered either by this first-tier EIS/EIR or by any second-tier document generated in connection with specific channel modification projects. If existing permitted mining operations are able to supply an adequate amount of spawning gravel, there would be no need to permit new mines.

Trinity County Floodplain Development Permits. Section 29.4 of the Trinity County Zoning Ordinance (Floodplain Management Ordinance) requires issuance of a Floodplain Development Permit for projects that alter the Trinity River floodplain on private lands within the jurisdiction of Trinity County. The proposed channel restoration projects and spawning gravel replacement projects on private lands would require issuance of Floodplain Development Permits. Such permits would be subject to environmental review under CEQA. The principal requirement of the permit is a certification by a registered professional engineer or architect that the proposed project will not adversely affect the flood-carrying capacity of the altered or relocated portion of said watercourse, and will not cumulatively raise the 100-year floodplain more than 1 foot. The Ordinance also requires notification of adjacent communities, CDFG, Corps, NCRWQCB, and DWR prior to such alteration or relocation of a watercourse, and the submission of evidence of such notification to the Federal Insurance Administration and Federal Emergency Management Agency.

5.2 Individuals Involved in Preparation of EIS/EIR (CHANGES FOLLOW) pgs. 5-9 through 5-12

The following agency representatives and individuals were consulted and/or were involved in the preparation of this EIS/EIR.

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Bruce Halstead	U.S. Fish and Wildlife	• Fisheries	Co-lead—Service

Preparer	Agency/Firm	Expertise and Issues Worked On	Title
	Service		
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Dan Licht	US. Fish and Wildlife Service	• Wildlife	Project Manager—1998-99
Mary Ellen Mueller	U.S. Fish and Wildlife Service	• Fisheries	Project Manager—1999
Ina Pisani	U.S. Fish and Wildlife Service	• Vegetation and Wildlife	
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Jerry Barnes	U.S. Forest Service	• Fisheries	Fish Team
Charley Fitch	U.S. Forest Service	• District Ranger • Fisheries • Vegetation and Wildlife	
Amy Lind	U.S. Forest Service	• Wildlife	
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Troy Fletcher	Yurok Tribe	• Tribal Trust • Fisheries	
Thomas Gates	Yurok Tribe	• Anthropologist	
Steve Hatchett	Private Consultant	• Agricultural Economics	Land Use
Greg Kamman	Private Consultant	• Water Quality • Hydrology	
Roger Mann	Private Consultant	• Socioeconomics • Land Use/M&I	
Kent Norville	Private Consultant	• Air Quality	

[a] Fish Team = Fisheries and Channel Restoration Team
[b] Wildlife Team = Wildlife-Riparian-Wetlands Team
[c] Recreation Team = Recreation-~~Visual Resources~~ Resources Team
[d] Water Team = Water Management and Operations Team

6.0 References *(SEE SUBSECTIONS)*

6.1 Publications (CHANGES FOLLOW)

The following references have been added:

California Energy Commission. 2000. California Energy Demand 2000-2010, Staff Report. June.

California Energy Commission. 1999. High Temperatures & Electricity Demand: An Assessment of Supply Adequacy in California Trends & Outlook. A report of the California Energy Commission Staff. July.

Hoopa Valley Tribe. 2000. Water Quality Control Plan, Hoopa Valley Indian Reservation. Adopted by the Hoopa Valley Tribal Council. June 8.

National Marine Fisheries Service. 2000. Biological Opinion for the Trinity River Mainstem Fishery Restoration EIS and its effects on Southern Oregon/Northern California Coast coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead. Southwest Region. October.

Rowell, J., U.S. Bureau of Reclamation, Sacramento, CA. 1998. Personal communication with Tim Hamaker, Fisheries Biologist, CH2M HILL, Redding, CA. 10 July.

U.S. Bureau of Reclamation. 1976b. Final Environmental Impact Statement, San Felipe Division, Volume I, Sacramento, CA.

U.S. Fish and Wildlife Service. 2000. Reinitiation of Formal Consultation. Biological Opinion on the Effects of Long-term Operation of the Central Valley Project and State Water Project as Modified by Implementing the Preferred Alternative in the Draft Environmental Impact Statement/Environmental Impact Report for the Trinity River Mainstem Fishery Restoration Program. Also, a Request for Consultation on the Implementation of this Alternative on the Threatened Northern Spotted Owl, Northern Spotted Owl Critical Habitat, and the Endangered Bald Eagle within the Trinity River Basin and where Applicable, Central Valley Reservoirs. Sacramento, CA. October.

6.2 Legal Reference *(NO CHANGE)*

Attachments *(SEE SUBSECTIONS)*

Attachment A Glossary of Terms, Abbreviations, and Acronyms, and Conversion Tables **(CHANGES FOLLOW)**

pg. A-4

Cubic feet per second (cfs)—A measure of the volume rate of water movement. As a rate of streamflow, a cubic foot of water passing a reference section in 1 second of time. One cubic foot per second equals 0.0283 m3/s (~~7.48~~ 448.83 gallons per minute). One cubic foot per second flowing for 24 hours produces approximately 2 af.

pg. A-14

The following new glossary term has been added:

X2—An SWRCB water quality criteria for the Bay-Delta relating to the management of water with 2 parts-per-thousand (ppt) concentration of salt. X2 is measured as kilometers (km) from the Golden Gate Bridge. Higher X2 values indicate salt water intrusion into the Delta (greater distance inland from the Golden Gate Bridge).

pgs. A-15 through A-20

The following new acronyms and abbreviations have been added:

AEAM	Adaptive Environmental Assessment and Management
Bay-Delta WQCP	Bay-Delta Water Quality Control Plan (1995)
CWA	Clean Water Act
FPR	Forest Practice Rules
Hoopa Valley WQCP	Hoopa Valley Tribe Water Quality Control Plan
HVTC	Hoopa Valley Tribal Council
LKRP	Lower Klamath Restoration Partnership
NCUAMD	North Coast Unified Air Management District
NPDES	National Pollutant Discharge Elimination System
Porter-Cologne	Porter-Cologne Water Quality Control Act
SMARA	Surface Mining and Reclamation Act
WDR	Waste Discharge Requirements

Attachment B Index *(NO CHANGE)*

2.3 Changes to the DEIS/EIR—Tables and Figures

Tables

Figures

TABLE 2-2
Operations, Policies, and Regulatory Requirements Assumed in the No Action Alternative

Issue or Policy	Description
Acreage Limitations in Contracts	Existing acreage limitation regulations adopted to implement Reclamation Reform Act of 1982.
CVP Operations	Continued operations as presented in CVP-OCAP 1992 and other operational procedures for CVP, adjusted for biological opinions and water quality standards. (Biological Opinion [May 1995] for winter chinook salmon and delta smelt. Biological Opinion for winter chinook salmon assumptions include maintenance of minimum Shasta Reservoir carryover storage of 1.9 maf in all years, except in driest 10 percent of years where reconsultation is needed. Monthly temperature targets at Bend Bridge and Jellys Ferry per the Biological Opinion, Bay-Delta Plan Accord, and SWRCB Order 95-06).
Contract Amounts for CVP (including shortage criteria)	Contracts would be renewed, per 1956 and 1963 Acts, prior to year 2020, including contracts with CVP and DWR associated with the Cross-Valley Canal.
	Maximum Contract Amount: Not-to-exceed existing contract amounts. Water deliveries not-to-exceed capacity of existing conveyance facilities.
	Agricultural Water Service Contracts, Water Rights Contracts, and Exchange Contracts: CVP water deliveries limited by maximum use between 1980 and 1993; projected use as addressed in environmental documentation; or maximum contract amount, whichever is less. Shortage criteria per, Operations Criteria and Plan (OCAP).
	Municipal and Industrial Water Service Contracts: Total demand based upon year 2020 demands in DWR Bulletin 160-93. CVP water deliveries limited by a) maximum use between 1980 and 1993; b) projected use as addressed in approved environmental documentation; or c) maximum contract amount, whichever is less. Shortage criteria with maximum shortage of 25 percent.
	Refuges: Delivery of Level 1 and Level 2 water supplies by existing suppliers. Shortage criteria using SWRCB Sacramento Valley 40-30-30 Index.
CVP Conservation Program	A long-term adaptive management program to address biological needs of special-status species, with an emphasis on habitat in areas affected by the CVP.
Coordinated Operations of CVP and SWP	Based upon COA framework with additional assumptions to implement new provisions of Bay-Delta Plan.
Delta Factors	Continued use of seasonal barriers at Old River and continued operation of Delta Cross-Channel gates.
Land Retirement	Retirement of 45,000 acres between 1992 and 2020 under existing State of California ***land retirement*** programs, per DWR Bulletin 160-93.
Minimum Instream Flow Requirements	**Sacramento River:** Per SWRCB Order 91-01 and the Winter-run Chinook Salmon Biological Opinion.

TABLE 2-2
Operations, Policies, and Regulatory Requirements Assumed in the No Action Alternative

Issue or Policy	Description
for CVP Facility	**American River:** Per Modified SWRCB D-1400 strategy of CVP operations with a fixed amount of flood control storage under the Corps interim requirements. **Stanislaus River:** Per SWRCB D-1422, including water quality standards on the San Joaquin River at Vernalis and ***dissolved oxygen*** requirements at Ripon; and 155,700 af/yr in all years but critically dry years, then 98,300 af/yr per initial studies conducted under the 1987 agreements with CDFG and the Service. **Trinity River:** Per Secretary's 1991 Decision ~~and CVPIA 3406(b)(23) a~~ flow not less then 340,000 af/yr in all years.
Shortage Criteria for State Water Project	Monterey agreement provisions for SWP.
Non-CVP Water Users	Use water demands in DWR Bulletin 160-93.
Power Marketing	Existing agreement between United States and Pacific Gas and Electric Company (PG&E) would not be renewed. Project use load met at all times.
Red Bluff Diversion Dam (RBDD) Gate Closure	Mid-May through mid-September per Winter-run Chinook Salmon Biological Opinion.
Tracy Direct Loss Mitigation Agreement	Reduces and offsets direct fish loss associated with operations of the Tracy Pumping Plant and Fish Facility.
Water Conservation	Water conservation levels based on assumptions presented in DWR Bulletin 160-93 for all water users, plus requirements by 1982 Reclamation Reform Act for CVP contractors.
CVP Rate Setting and Water Pricing	Existing rate setting and cost-allocation policies, and ability-to-pay policies per Reclamation Mid-Pacific Region Policies, including 1988 policies, and Reclamation Reform Act draft rules and regulations.
Water Transfer	CVP water can be transferred between ***CVP water service contractors***. SWP water can be transferred per the Monterey Agreement, and water rights holders can transfer water under SWRCB guidelines.
Water Rights	Total water rights would be delivered in all water-year classes (except in shortage conditions) even if water rights had not been previously fully utilized.
U.S. Department of Agriculture (USDA) Farm Commodities Program	Program would remain in place and would follow 1992 policies.

TABLE 2-4
Annual Volumes and Peak Releases—Maximum Flow Alternative

Water-year class	Acre-feet	Peak Flow ~~(af)~~ (cfs)
Critically dry	463,000	2,000
Dry	889,000	3,800
Normal	1,206,000	5,429
Wet	1,508,000	6,786
Extremely wet	2,146,000	30,000

Peak flow releases and timing: 30,000 cfs/5 days in May (extremely wet years only)

TABLE 2-5
Annual Volumes and Peak Releases—Flow Evaluation Alternative

Water-year Class	Acre-feet	Peak Flow ~~(af)~~ (cfs)
Critically dry	369,000	1,500
Dry	453,000	4,500
Normal	~~636,000~~ 647,000	6,000
Wet	701,000	8,500
Extremely wet	815,000	11,000

Peak flow releases and timing: 11,000 cfs/5 days in May (extremely wet water-year class only)

TABLE 2-6
Annual Volumes and Peak Releases—Percent Inflow Alternative

Water-year Class	Acre-feet	Peak Flow ~~(af)~~ (cfs)
Critically dry	165,000	696
Dry	325,000	1,306
Normal	443,000	1,740
Wet	655,000	2,476
Extremely wet	978,000	3,745

Peak flow over modeled hydrologic record: 11,000 cfs

TABLE 2-9
Summary Description of Alternatives

Features	Alternatives					
	No Action	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**
Water Management Trinity River instream flows	Not less than 340,000 af in all water-year classes	Critically dry 463,000 af Dry 889,000 af Normal 1,206,000 af Wet 1,508,000 af Extremely wet 2,146,000 af	Critically dry 369,000 af Dry 453,000 af Normal ~~636,000~~ 647,000 af Wet 701,000 af Extremely wet 815,000 af	Critically dry 165,000 af Dry 325,000 af Normal 443,000 af Wet 655,000 af Extremely wet 978,000 af	Same as No Action	120,500 af in all water-year classes
Peak flow releases and duration	2,000 cfs for 17 days in May	30,000 cfs for 5 days in May (extremely wet water year)	11,000 cfs for 5 days in May (extremely wet water year)	Estimated peak release of 11,000 cfs for 1 week (based on historical records)	Same as No Action	250 cfs for 30 days in November
Water Operations	Maintain current operation of CVP as identified in CVP-OCAP (including current Biological Opinions & December 15, 1994 Bay/Delta Accord Principles).	No diversions through Clear Creek Tunnel; assumes appropriate revisions to OCAP and endangered species consultation as necessary. Water-year determinations would likely need to emphasize storage-based criteria in addition to predicted Trinity inflow.	Timing of diversions through Clear Creek Tunnel would be shifted to the summer/ early fall period; assumes appropriate revisions to OCAP and endangered species as necessary.	Timing of diversions through Clear Creek Tunnel would be shifted to the summer/early fall period; assumes appropriate revisions to OCAP and endangered species consultation as necessary.	Same as No Action	Greater quantity of water would be diverted through the Clear Creek Tunnel; assumes appropriate revisions to OCAP and endangered species consultation as necessary.
Carryover storage	400,000 af	Same as No Action	600,000 af	600,000 af	Same as No Action	Same as No Action
Watershed Protection	Maintain sediment control structures Administer existing land management plans and enforce Trinity County grading ordinance Implement South Fork Trinity River Action Plan Enforce CDF Forest Practice Rules	Same as No Action	Same as No Action	Same as No Action	No Action measures plus additional maintenance and rehabilitation of road system within the watershed	Same as No Action
Fish Habitat Management						
Mechanical Channel Rehabilitation						
Maintain 27 existing rehabilitation projects	X				X	
Construct 47 additional rehabilitation projects			X	X	X	
Maintain existing and proposed projects mechanically					X	
Maintain existing and proposed projects with flow			X	X		
Place spawning gravel (quantity/ frequency) (note – the figures are estimates, actual volumes could vary by plus/minus 50 percent or greater)	Place 3,400 yd^3/yr of gravel (assumes gravel placement associated with Safety of Dam releases)	Water-year Class yd^3/yr Critically dry 0 Dry 150 Normal 1,500 Wet 14,550 Extremely wet >100,000 (assumes that placement of spawning gravel associated with Safety of Dam releases does not occur)	Water-year Class yd^3/yr Critically dry 0 Dry 200 Normal 2,000 Wet 14,200 Extremely wet 49,100 (assumes that placement of spawning gravel associated with Safety of Dam releases does not occur)	Water-year Class yd^3/yr Critically dry 0 Dry 0 Normal 50 Wet 1,350 Extremely wet 4,650 (assumes that placement of spawning gravel associated with Safety of Dam releases does not occur)	Same as No Action	Place 3,700 yd^3/yr of gravel (assumes gravel placement associated with Safety of Dam releases)
Sediment dredging pools	Grass Valley Creek ponds	Same as No Action	Same as No Action	Same as No Action	No Action measures plus 10 pools in mainstem	Same as No Action
Fish Population Management	Maintain current fishing policies	Same as No Action	Same as No Action	Same as No Action	Same as No Action	Same as No Action
Trinity Dam Modifications	No	Yes	No	No	No	No

TABLE 3-3
Comparison of Impacts on Water Resources

Parameter	Hydrologic Conditions[a]	Alternatives Compared to No Action: No Action	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions	Preferred Alternative to Existing Conditions
Trinity Reservoir elevation (ft)	Dry	~~2,255~~ 2,264	~~34~~ 25	~~11~~ 2	~~19~~ 10	0	~~22~~ 13	2,267	-1
May 30	Wet	~~2,352~~ 2,357	~~-43~~ –48	~~-3~~ –8	~~-8~~ -13	0	~~6~~ 1	2,357	-8
	Average	~~2,319~~ 2,325	~~-33~~ –39	~~4~~ –2	~~2~~ -4	0	~~16~~ 10	2,325	-2
September 30	Dry	~~2,207~~ 2,214	~~-64~~ 57	~~18~~ 11	~~25~~ 18	0	~~11~~ 4	2,217	8
	Wet	~~2,318~~ 2,319	~~-18~~ –19	~~-2~~ -3	~~-2~~ -3	0	~~4~~ 3	2,320	-4
	Average	~~2,282~~ 2,285	~~-9~~ –12	~~2~~ –1	~~4~~ 1	0	~~11~~ 8	2,287	-3
Shasta Reservoir elevation (ft)	Dry	995	-22	-7	-3	0	0	998	-10
May 30	Wet	1,062	-3	-3	-1	0	1	1,062	-3
	Average	1,045	-5	-3	-1	0	1	1,046	-4
September 30	Dry	933	-65	-11	-1	0	3	939	-17
	Wet	1,020	-15	-6	-2	0	2	1,020	-6
	Average	992	-15	-3	0	0	4	995	-6
San Luis Res. elevation (ft)	Dry	467	4	1	1	0	-3	463	5
May 30	Wet	511	-2	1	0	0	1	520	-8
	Average	487	4	1	0	0	0	491	-3
September 30	Dry	381	-3	-2	0	0	-5	373	6
	Wet	430	-10	1	-1	0	1	445	-14
	Average	396	-2	-2	0	0	0	401	-7
Trinity River Exports (af/yr)	Dry	540,000	-100%	-30%	-2%	0%	39%	530,000	-28%
	Wet	1,110,000	-100%	-33%	-26%	0%	17%	1,100,000	-33%
	Average	870,000	-100%	-28%	-16%	0%	23%	870,000	-28%
Trinity Reservoir storage (af)	Dry	730,000	60%	5%	14%	0%	5%	750,000	3%
September 30	Wet	1,720,000	-15%	-2%	-2%	0%	2%	1,730,000	-2%
	Average	1,390,000	-12%	-4%	-1%	0%	6%	1,400,000	-4%

TABLE 3-3
Comparison of Impacts on Water Resources

Parameter	Hydrologic Conditions[a]	Alternatives Compared to No Action: No Action	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions	Preferred Alternative to Existing Conditions
Shasta Reservoir storage (af)	Dry	1,690,000	-30%	-8%	-1%	0%	2%	1,780,000	-12%
September 30	Wet	3,290,000	-10%	-4%	-1%	0%	1%	3,280,000	-4%
	Average	2,770,000	-8%	-2%	0%	0%	2%	2,810,000	-4%
San Luis Reservoir storage (af)	Dry[b]	390,000	-5%	-3%	0%	0%	-10%	340,000	12%
September 30	Wet	850,000	-13%	0%	-1%	0%	1%	990,000	-14%
	Average	540,000	-6%	-4%	-2%	0%	-2%	590,000	-12%
CVP deliveries north of Delta[b] (af/yr)	Dry[b]	2,680,000	-6%	-4%	0%	0%	2%	2,390,000	8%
	Wet	3,240,000	-1%	0%	0%	0%	0%	2,880,000	13%
	Average	3,120,000	-4%	-1%	0%	0%	1%	2,780,000	11%
CVP deliveries south of Delta[b] (af/yr)	Dry[b]	1,580,000	-13%	-3%	1%	0%	13%	1,630,000	-6%
	Wet	2,960,000	-3%	-1%	0%	0%	0%	2,980,000	-1%
	Average	2,570,000	-13%	-2%	0%	0%	2%	2,600,000	-3%
Exports, Tracy Pumping Plant (af/yr)	Dry	1,810,000	-13%	-5%	0%	0%	10%	1,830,000	-6%
	Wet	2,850,000	-1%	0%	0%	0%	0%	2,870,000	-1%
	Average	2,640,000	-12%	-2%	0%	0%	2%	2,670,000	-3%
Exports, Banks Pumping Plant (af/yr)	Dry	1,860,000	-2%	~~1%~~ 2%	0%	0%	3%	1,880,000	1%
	Wet	4,060,000	-1%	-1%	0%	0%	-1%	3,160,000	27%
	Average	3,310,000	-1%	0%	0%	0%	0%	2,890,000	14%
Exports, Tracy and Banks Pumping Plants (af/yr)	Dry	3,670,000	-5%	-2%	0%	0%	6%	3,710,000	-3%
	Wet	6,910,000	-1%	-1%	0%	0%	0%	6,030,000	14%
	Average	5,950,000	-6%	-1%	0%	0%	1%	5,560,000	6%

TABLE 3-3
Comparison of Impacts on Water Resources

		Alternatives Compared to No Action							
Parameter	**Hydrologic Conditions[a]**	**No Action**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**	**Existing Conditions**	**Preferred Alternative to Existing Conditions**
Delta Inflow (af/yr)	Dry	11,830,000	-2%	-1%	0%	0%	2%	11,850,000	~~0%~~ -1%
	Wet	29,730,000	-4%	-1%	-1%	0%	1%	29,690,000	-1%
	Average	22,570,000	-4%	-1%	-1%	0%	1%	22,550,000	-1%
Delta Outflow (af/yr)	Dry	6,320,000	-1%	0%	0%	0%	-1%	6,320,000	0%
	Wet	20,890,000	-5%	-1%	-1%	0%	1%	21,770,000	-5%
	Average	14,710,000	-3%	-1%	-1%	0%	1%	15,120,000	-4%
Trinity River releases (af/yr)	Critically dry	340,000[b]	36%	8.5%	-51%	0%	-65%	340,000	8.5%
	Dry	340,000[b]	160%	33%	-4.7%	0%	-65%	340,000	33%
	Normal	340,000[b]	250%	~~87~~ 90%	30%	0%	-65%	340,000	87%
	Wet	340,000[b]	340%	110%	93%	0%	-65%	340,000	110%
	Extremely wet	340,000[b]	530%	140%	190%	0%	-65%	340,000	140%

[A]"Dry" is based on hydrology in the dry period (1928-34); "wet" is based on a wet period (1967-71); and "average" is based on the long-term average (1922-90).

[B]Plus additional releases as required by U.S. Bureau of Reclamation Safety of Dams criteria, if needed.

TABLE 3-5A
Water Temperature Criteria (°C) of the Hoopa Valley Tribe WQCP for the Mainstem Trinity River

Water-year Class	Time Periods				
Extremely Wet, Wet, and Normal	May 23 - Jun 4	Jun 5 - Jul 9	Jul 10 - Sep 14	Sep 15 - Oct 31	Nov 1 - May 22
Criteria [a]	15.0	17.0	22.1	19.0	13.0
Dry and Critically Dry	May 23 - Jun 4	Jun 5 – Jun 15	Jun 16 - Sep 14	Sep 15 - Oct 31	Nov 1 - May 22
Criteria [a]	17.0	20.0	23.5	19.0	15.0

[a]Criteria represent 7-day running averages and are not to be exceeded.

TABLE 3-8A
Percentage of the Year that Water Temperatures of the Trinity River Would Meet the Water Temperature Objectives Identified in the Hoopa Valley Tribe WQCP

Water Year	Expected No. of Occurrences Per 100 Years	Modeled Year	Alternatives							
			State Permit	No Action	Percent Inflow	Flow Evaluation	Maximum Flow	Exist. Contd.	Cum. 400K[a]	Cum. 600K[a]
C.Dry	12	1977	88	88	87	92	100	88	88	92
Dry	28	1990	85	92	88	94	98	92	94	94
Normal	20	1989	65	69	71	85	94	69	81	87
Wet	28	1986	69	73	77	92	94	73	92	92
E.Wet	12	1983	94	100	94	100	90	100	100	100
Wt. Avg.	-	-	78	83	82	92	96	83	91	93

[a]Flow schedules are identical to the Flow Evaluation Alternative. These alternatives, which utilize different minimum carryover storages in Trinity Reservoir, were evaluated for the influence of altered diversion patterns on the Hoopa EPA criteria.

TABLE 3-9
Water Quality Summary Table Sacramento River Impacts

	No Action	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions
Sacramento River Violations[a]							
Percentage of months with violations	~~19.7%~~ 15.9%	22.8%	20.5%	20.1%	~~19.7%~~ 15.9%	16.4%	14.3%
Shasta Carryover Storage Violations							
Percentage of years less than 1.9 maf	11.6%	14.5%	11.6%	11.6%	11.6%	10.1%	8.7%
Average Modeled Position of X2 in Delta, Distance from Golden Gate Bridge (km)							
Average Period (1922-1990)	75.2	75.6	75.3	75.3	75.2	75.1	74.9
Wet Period (1967-1971)	70.1	71.0	70.5	70.3	70.1	70.0	69.6
Dry Period (1928-1934)	80.7	80.8	80.6	80.7	80.7	80.7	80.7

[a]As established in the Sacramento Winter-run Biological Opinion. Temperature standards are enforced April through October.

TABLE 3-10
Life History and Habitat Needs for Anadromous Salmonid Fish in the Trinity River Basin

Name	Migration	Spawning	Rearing	Rearing Habitat Description
Chinook (spring)	Spring-Summer	Early Fall	Winter-Spring-Summer	Shallow, slow-moving waters adjacent to higher water velocities for feeding.
Chinook (fall)	Fall	Fall	Winter-Spring-Summer	Shallow, slow-moving waters adjacent to higher water velocities for feeding.
Steelhead (winter)	Fall-winter	February-April	Year round	Areas of clean cobble where there is refuge from high velocities; juveniles overwinter for 1-2 or more years.
Steelhead (summer)	Spring-Summer	February-April	Year round	Areas of clean cobble where there is refuge from high velocities; juveniles overwinter for 1-2 or more years.

TABLE 3-13A
Estimates of Yurok and Hoopa Valley Tribal Harvest of Adult Coho Salmon, 1984-1999

Year	Yurok Harvest[a]	Hoopa Harvest[b]	Total	Escapement above Willow Creek Weir[c]
1984	360	376	736	4,486
1985	1,894	1,115	3,009	29,717
1986	163	85	248	9,063
1987	904	608	1,512	51,826
1988	573	210	783	36,173
189	511	477	988	18,462
1990	377	88	465	3,485
1991	391	105	496	8,859
1992	122	52	174	7,961
1993	1,164	111	1,275	5,048
1994	25	25	50	239
1995	826	38	864	1,547
1996	738	208	946	35,391
1997	75	58	133	1,984
1998	180	136	316	
1999	235	101	336	
Average	**534**	**237**	**771**	

[a]Yurok Tribe unpublished data; 1999 annual report in preparation.

[b]Personal communication, George Kautsky, Fishery Biologist, Hoopa Valley Tribe Fisheries Department.

[c]Escapement of adult coho salmon into Trinity River above Willow Creek weir operated by California Department of Fish and Game. From CDFG Annual Performance Report, Trinity River Basin Salmon and Steelhead Monitoring Project, 1997-1998, Includes inriver spawners, hatchery returns, and angler harvest.

TABLE ~~3-20~~ 3-19
Fish Harvest Estimates by Alternative

	Alternatives					
	No Action	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**
Ocean Salmon Commercial Fishery						
Northern /Central Oregon						
Trinity River naturally produced	1,390	21,520	17,330	4,810	3,440	0
Total	369,100	580,300	565,500	517,700	511,600	197,500
KMZ-Oregon						
Trinity River naturally produced	50	1,280	990	220	150	0
Total	2,500	27,100	25,200	18,800	17,900	0
KMZ-California						
Trinity River naturally produced	50	1,070	860	190	120	0
Total	2,100	23,800	22,100	16,500	15,800	0
Mendocino						
Trinity River naturally produced	150	3,480	2,710	630	430	0
Total	13,700	96,600	85,600	49,800	45,200	0
San Francisco						
Trinity River naturally produced	1,030	4,470	4,170	2,330	1,910	0
Total	199,300	208,200	208,200	208,200	208,200	144,700
Monterey						
Trinity River naturally produced	800	3,480	3,240	1,820	1,490	0
Total	155,100	155,100	155,100	155,100	155,100	112,300
Totals for All Regions						
Trinity River naturally produced	3,470	35,300	29,300	10,000	7,540	0
Total	741,800	1,091,100	1,061,700	966,100	953,800	454,500
Ocean Salmon Sport Fishery						
Northern/Central Oregon	99,200	156,000	152,100	139,200	137,600	53,100
KMZ-Oregon	3,600	38,700	36,000	26,900	25,600	3,600
KMZ-California	4,000	45,200	42,000	31,300	30,000	4,000
Mendocino	2,200	15,600	13,800	8,000	7,300	2,200
San Francisco	73,800	77,100	77,100	77,100	77,100	53,600
Monterey	50,000	50,000	50,000	50,000	50,000	36,200
Total for All Regions	**232,800**	**382,600**	**371,000**	**332,300**	**327,600**	**152,700**

TABLE ~~3-19~~ 3-20
Ocean Salmon Sportfishing Trips and Angler Benefits (in 1997 dollars)

		Change Compared to No Action					Change to Existing Conditions	
Trips and Benefits by Region of Activity	**No Action**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**	**1995 Existing Conditions**	**2020 Preferred Alternative**
Northern/Central Oregon[a]								
Total Trips	186,710	207,050	205,830	201,720	201,170	161,880	150,740	205,830
Angler benefits	$13,443,120	$14,907,600	$14,819,400	$14,523,840	$14,484,240	$11,655,720	$10,853,640	$14,819,400
Net change in angler benefits		$1,464,480	$1,376,280	$1,080,720	$1,041,120	-$1,787,400		$3,965,760
Percent change in angler benefits		11%	10%	8%	8%	-13%		37%
KMZ-Oregon[a]								
Total Trips	56,970	95,970	94,390	88,280	87,300	49,330	38,960	94,390
Angler benefits	$4,101,840	$6,909,840	$6,796,080	$6,356,160	$6,285,600	$3,551,760	$2,805,120	$6,796,080
Net change in angler benefits		$2,808,000	$2,694,240	$2,254,320	$2,183,760	-$550,080		$3,990,960
Percent change in angler benefits		68%	66%	55%	53%	-13%		142%
KMZ-California[a]								
Private boat trips	40,930	50,080	49,540	47,430	47,130	32,890	27,720	49,540
Private boat angler benefits	$2,516,400	$3,605,760	$3,566,880	$3,414,960	$3,393,360	$2,367,360	$1,879,200	$3,566,520
Net change in angler benefits[a]		$1,089,360	$1,050,480	$898,560	$876,960	-$149,040		$1,687,320
Percent change in angler benefits		43%	42%	36%	35%	-6%		90%
Charter boat trips	1,290	2,250	2,210	2,070	2,050	1,170	1,020	2,210
Charter boat angler benefits	$92,880	$162,000	$159,120	$149,040	$147,600	$84,240	$73,440	$159,120
Net change in angler benefits[a]		$69,120	$66,240	$56,160	$54,720	-$8,640		$85,680
Percent change in angler benefits		74%	71%	60%	59%	-9%		117%
Mendocino[a]								
Private boat trips	29,700	39,680	38,970	35,970	35,440	22,170	21,060	38,970
Private boat angler benefits	$2,137,680	$2,856,960	$2,805,840	$2,589,840	$2,551,680	$1,596,240	$1,516,320	$2,805,840
Net change in angler benefits		$719,280	$668,160	$452,160	$414,000	-$541,440		$1,289,520
Percent change in angler benefits		34%	31%	21%	19%	-25%		85%
Charter boat trips	4,020	6,270	6,110	5,390	5,290	2,580	2,860	6,110
Charter boat angler benefits	$290,160	$451,440	$439,920	$388,080	$380,880	$185,760	$205,920	$439,920
Net change in angler benefits		$161,280	$149,760	$97,920	$90,720	-$104,400		$234,000

TABLE ~~3-19~~ 3-20
Ocean Salmon Sportfishing Trips and Angler Benefits (in 1997 dollars)

		Change Compared to No Action					Change to Existing Conditions	
Trips and Benefits by Region of Activity	**No Action**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**	**1995 Existing Conditions**	**2020 Preferred Alternative**
Percent change in angler benefits		56%	52%	34%	31%	-36%		114%
San Francisco[a]								
Private boat trips	57,100	57,100	57,100	57,100	57,100	54,330	44,800	57,100
Private boat angler benefits	$4,110,480	$4,110,480	$4,110,480	$4,110,480	$4,110,480	$3,911,760	$3,225,600	$4,110,480
Net change in angler benefits		$0	$0	$0	$0	-$198,720		$884,880
Percent change in angler benefits		0%	0%	0%	0%	-5%		27%
Charter boat trips	82,310	83,390	83,390	83,390	83,390	76,930	64,600	83,390
Charter boat angler benefits	$5,926,320	$6,004,080	$6,004,080	$6,004,080	$6,004,080	$5,538,960	$4,651,200	$6,004,080
Net change in angler benefits		$77,760	$77,760	$77,760	$77,760	-$387,360		$1,352,880
Percent change in angler benefits		1%	1%	1%	1%	-7%		29%
Monterey[a]								
Private boat trips	89,070	89,070	89,070	89,070	89,070	84,890	56,040	89,070
Private boat angler benefits	$6,413,040	$6,413,040	$6,413,040	$6,413,040	$6,413,040	$6,112,080	$4,034,880	$6,413,040
Net change in angler benefits		$0	$0	$0	$0	-$300,960		$2,378,160
Percent change in angler benefits		0%	0%	0%	0%	-5%		59%
Charter boat trips	43,710	43,710	43,710	43,710	43,710	40,610	27,500	43,710
Charter boat angler benefits	$3,147,120	$3,147,120	$3,147,120	$3,147,120	$3,147,120	$2,923,920	$1,980,000	$3,147,120
Net change in angler benefits		$0	$0	$0	$0	-$223,200		$1,167,120
Percent change in angler benefits		0%	0%	0%	0%	-7%		59%
Totals for All Regions								
Total trips	591,820	674,570	670,320	654,130	651,650	526,780	435,300	670,320
Total angler benefits	$42,179,040	$48,568,320	$48,261,960	$47,096,640	$46,918,080	$37,927,800	$31,225,320	$48,261,960

[a]For Oregon ports, only one model for predicting the number of boat (both private and charter) trips taken by sportfishers was available; for California ports, separate models for predicting trips taken by charter and private boats were available for analyzing benefits of ocean sportfishing activity.

TABLE 3-24
Special-status Plant Species Occurring or Potentially Occurring in Riparian, Wetland, and Riverine Habitat along the Trinity and Lower Klamath Rivers

Common Name	Scientific Name	Status		
		CNPS	CA	Federal
Rattan's milk-vetch[a]	*Astragalus rattanii* var. *rattanii*	4		
Bottlebrush sedge[a]	*Carex histricina*	2		
Fox sedge	*Carex vulpinoidea*	2		
California lady's-slipper[a]	*Cypripedium californicum*	4		
Clustered lady's-slipper[a]	*Cypripedium fasciculatum*	4		FSC
Heckner's lewisia[a]	*Lewisia cotyledon* var. *heckneri*	1B		FSC
Showy raillardella[a]	*Raillardella pringlei*	1B		FSC
Great burnet[a]	*Sanguisorba officinalis*	2		
English peak greenbriar[a]	*Smilax jamesii*	1B		

[a]Known to occur in the general area of the project.

Status Definitions:
CNPS California Native Plant Society
1B Plants considered rare, threatened, or endangered ~~throughout their range~~ in California and elsewhere
2 Plants considered rare, threatened, or endangered in California, but more common elsewhere
4 Plants of limited distribution
FSC ***Federal Species of Concern***

TABLE 3-25
Special-status Plant Species Potentially Occurring in the Central Valley

Common Name	Scientific Name	Status		
		CNPS	CA	Federal
Suisun marsh aster	*Aster lentus*	1B		FSC
Fox sedge	*Carex vulpinoidea*	2		
Suisun thistle	*Cirsium hydrophilum* var. *hydrophilum*	1B		FE
Soft bird=s beak	*Cordylanthus mollis* ssp. *mollis*	1B	CR	FE
Silky cryptantha	*Crypthantha crinita*	1B		FE
Rose-mallow	*Hibiscus lasiocarpus*	2		
Northern California black walnut	*Juglans californica* var. *hindsi*	1B		FSC
Mason=s lilaeopsis	*Lilaeopsis masoni*	1B	CR	FSC
Delta mudwort	*Limosella subulata*	2		
Eel-grass pondweed	*Potamogeton zosteriformes*	2		
Sandford=s arrowhead	*Sagittaria sanfordii*	1B		FSC

Status Definitions:
FE Listed and endangered under federal Endangered Species Act
FSC Federal Species of Concern
CR Considered as rare by the State of California
CNPS California Native Plant Society
1B ~~List 1B species:~~ Plants considered rare, threatened, or endangered in California and elsewhere ~~throughout their range~~
2 ~~List 2 species:~~ Plants considered rare, threatened, or endangered in California, but more common elsewhere

TABLE 3-32
Preferred Recreation Flow Ranges/Thresholds[a]

Activity	Preferred Flow Ranges (cfs)
Canoeing	200-1,500
Drift-boat and drift-raft fishing	200-1,500
White-water activities (i.e., kayaking, canoeing, and rafting)	~~300~~450-8,000
Recreational mining	350-600
Shore fishing	300-800
Swimming/inner-tubing	150-800
Wading	300-800
Campground Use Precluded	**Flow Threshold**
Steel Bridge, Douglas City	8,000 or greater
Steiner Flat, North Fork	10,000 or greater
Poker Bar	12,000 or greater

[a]Trinity River flows in the Preferred Flow/Threshold range during the primary recreation season (Memorial Day to Labor Day) as measured at the Lewiston gage.

TABLE 3-33
Riverine Recreation Opportunities – Trinity River

		Recreation Opportunity Constraints During the Primary Recreation Season[a, b]					
Resource Concern	**Preferred Flow Range (cfs)**	**No Action/Existing Conditions**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**
Canoeing	200-1,500	No constraint[c]	Constrained 8 weeks in **extremely wet** and **wet** years. Constrained 6 weeks in **normal** and **dry** years. Constrained 5 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet** years and **normal** years. Constrained 1 week in **dry** years. Not constrained during **critically dry** years.	Constrained 8 weeks in **extremely wet**, **wet**, **normal**, and **dry** years. Constrained 10 weeks in **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Camping							
Steel Bridge, Douglas City	8,000 or less	No constraint	No constraint	Constrained 1 week in **extremely wet** years.	No constraint	No constraint	No constraint
Steiner Flat, North Fork	10,000 or less	No constraint	No constraint	No constraint	No constraint	No constraint	No constraint
Poker Bar	12,000 or less	No constraint	No constraint	No constraint	No constraint	No constraint	No constraint
Drift-boat fishing	300-1,500	No constraint	Constrained 8 weeks in **extremely wet** and **wet** years. Constrained 6 weeks in **normal** and **dry** years. Constrained 5 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet** and **normal** years. Constrained 1 week in **dry** years. Not constrained during **critically dry** years.	Constrained 9 weeks in **extremely wet**, **wet** and **normal** years. Constrained 10 weeks during **dry** years. Constrained 12 weeks during **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Drift-raft fishing	200-1,500	No constraint	Constrained 8 weeks in **extremely wet** and **wet** years. Constrained 6 weeks in **normal** and **dry** years. Constrained 5 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet** and **normal** years. Constrained 1 week in **dry** years. Not constrained during **critically dry** years.	Constrained 8 weeks in **extremely wet**, **wet, normal,** and **dry** years. Constrained 10 weeks in **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
White-water (i.e., kayaking, canoeing, and rafting)	~~300~~450-8,000	No constraint	No constraint	Constrained 1 week in extremely **wet** years.[d] Not constrained in wet, normal, dry, and critically dry years.	Constrained ~~4~~ 6 weeks in **extremely wet** years. Constrained ~~7~~ 9 weeks in **wet** years. Constrained ~~9~~ 10 weeks in **normal** years. Constrained ~~10~~ 11 weeks in **dry** years. Constrained ~~12~~ 14 weeks in **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Recreational mining	350-600	Constrained 3 weeks in **all** water-year classes.	Constrained 10 weeks in **extremely wet** years. Constrained 15 weeks (entire recreation season) in **wet, normal, dry,** and **critically dry** years.	Constrained 8 weeks in **extremely wet**, **wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 13 weeks in **extremely wet**, **wet**, **dry**, and **critically dry** years. Constrained 14 weeks in **normal** years.	Constrained 3 weeks in **all** water-year classes.	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.

TABLE 3-33
Riverine Recreation Opportunities – Trinity River

		Recreation Opportunity Constraints During the Primary Recreation Season[a, b]					
Resource Concern	**Preferred Flow Range (cfs)**	**No Action/Existing Conditions**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**
Swimming/inner-tubing	150-800	Constrained 2 weeks in **all** water-year classes.	Constrained 9 weeks in **extremely wet** years. Constrained 11 weeks in **wet** years. Constrained 8 weeks in **normal** and **dry** years. Constrained 15 weeks (entire recreation season) in **critically dry** years.	Constrained 7 weeks in **extremely wet, wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 9 weeks in **extremely wet** years and **dry** years. Constrained 10 weeks in **wet, normal** and **critically dry** years.	Constrained 2 weeks in **all** water-year classes.	No constraint
Shore fishing	300-800	Constrained 2 weeks in **all** water-year classes.	Constrained 9 weeks in **extremely wet** years. Constrained 11 weeks in **wet** years. Constrained 8 weeks in **normal** and **dry** years. Constrained 15 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet, wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 12 weeks in **all** water-year classes.	Constrained 2 weeks in **all** water-year classes.	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Wading	300-800	Constrained 2 weeks in **all** water-year classes.	Constrained 9 weeks in **extremely wet** years. Constrained 11 weeks in **wet** years. Constrained 8 weeks in **normal** and **dry** years. Constrained 15 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet, wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 12 weeks in **all** water-year classes.	Constrained 2 weeks in **all** water-year classes.	Constrained 15 weeks (the entire primary recreation season) in all water-year classes.

[a]See Recreation Resources Technical Appendix D for more specific information about weekly flows impacts to recreation opportunities.

[b]The primary recreation season is defined as Memorial Day to Labor Day (approximately the last week in May to the end of the first week in September).

[c]Flows within preferred range during the entire primary recreation season for all year classes.

[d]White-water kayaking and rafting are constrained during the last week of May during the extremely wet water-year class when the Trinity River flows exceed the upper preferred threshold of 8,000 cfs. In general, however, those who prefer flows on the higher end of the preferred range would experience improved conditions compared to No Action.

TABLE 3-36
Summary of Impacts to Trinity, Shasta, and Folsom Reservoir Recreation Opportunities

	Projected Recreation Facility Availability During the Recreation Season[a]												
	No Action	**Maximum Flow**	**Percent Change**	**Flow Evaluation**	**Percent Change**	**Percent Inflow**	**Percent Change**	**Mechanical Restoration**	**Percent Change**	**State Permit**	**Percent Change**	**Existing Conditions**	**Preferred Alternative Percent Change from Existing Conditions**
Facility and Threshold Elevation (msl)													
Trinity Reservoir													
Stuart Fork Ramps (2,320)	~~42~~ 45	9	~~-33~~ -36	42	~~0~~ -3	41	~~-1~~ -4	~~42~~ 45	0	56	~~14~~ 11	46	4
Fairview Ramp & Major Marina Relocations Required (2,310)	~~52~~ 52	18	~~-34~~ -36	52	~~0~~ -2	50	~~-2~~ -4	~~52~~ 54	0	62	~~10~~ 8	55	3
Trinity Center Ramp (2,295)	~~62~~ 63	35	~~-27~~ -28	63	~~1~~ 0	59	~~-3~~ -4	~~62~~ 63	0	72	~~10~~ 9	63	1
Campground Use (2,270)	~~74~~ 78	64	~~-10~~ -14	79	~~5~~ 1	80	~~6~~ 2	~~74~~ 78	0	84	~~10~~ 6	80	6
Minersville Ramp (2,170)	~~99~~ 100	99	~~0~~ -1	100	~~1~~ 0	100	~~1~~ 0	~~99~~ 100	0	100	~~1~~ 0	100	1
Shasta Reservoir													
McCloud Arm Ramps (952)	92	89	-3	90	-2	90	-2	92	0	92	0	93	1
Sacramento Arm Ramps (950)	92	89	-3	91	-1	92	0	92	0	92	0	94	2
Sacramento Arm Marina (937)	93	89	-4	93	0	94	1	93	0	94	1	95	2
Pit Arm Ramps (907)	98	93	-5	96	-2	98	0	98	0	99	1	98	0
Centimudi Ramp (844)	100	97	-3	100	0	100	0	100	0	100	0	100	0
Folsom Reservoir													
Last boat ramp out of operation (360)	98	99	1	98	0	98	0	98	0	98	0	99	1
Limited lake surface area (boating constrained at 400)	87	89	-10	83	-4	86	-1	87	0	89	2	89	2
Marina closes (405)	80	82	-8	76	-4	79	-1	80	0	83	3	82	2
Decline in campground/picnicking use (430)	56	56	-3	53	-3	54	-2	56	0	55	-1	56	0
Beach area inundated (450)	31	32	-2	30	-1	30	-1	31	0	31	0	32	1

[a]The primary recreation season is defined as approximately Memorial Day to Labor Day.

TABLE 3-37
Summary of Impacts to Reservoir Use and Benefits[a]

Resource Concern	No Action	Maximum Flow		Flow Evaluation		Percent Inflow		Mechanical Restoration	State Permit		Existing Conditions[b]	
		Amount	Percent Change from No Action	Amount	Percent Change from No Action	Amount	Percent Change from No Action		Amount	Percent Change from No Action	Amount	Preferred Alternative Percent Change from Existing Conditions
Trinity Reservoir												
Recreation Benefits[c] (million $)	~~8.7~~ 8.8	8.4	~~-4~~ -5	~~8.7~~ 8.8	~~1~~ 0	8.8	~~2~~ 1	Same as No Action	9.2	~~6~~ 5	5.3	66
Visitor Days	~~796,200~~ 803,600	766,200	~~-4~~ -5	802,800	~~1~~ 0	809,700	~~2~~ 1	Same as No Action	841,000	~~6~~ 5	484,900	66
Shasta Reservoir												
Recreation Benefits (million $)	61.9	56.9	-8	60.9	-2	61.8	0	Same as No Action	63.1	2	38.0	60
Visitor Days	5,682,700	5,216,500	-8	5,583,400	-2	5,673,600	0	Same as No Action	5,786,800	2	3,483,100	60

[a] Long-term average water conditions only.
[b] 1995 existing conditions.
[c] All benefits are expressed in 1997 dollars.

Notes:
Impacts shown for long-term average water conditions only. See Recreational Technical Appendix D for dry water conditions.

TABLE 3-38
Trinity, Shasta, and Folsom Reservoir Recreation Opportunities, Use, and Benefits [a,b]

Recreation Facility Availability During the Recreation Season	Existing Conditions	No Action	Maximum Flow		Flow Evaluation		Percent Inflow		Mechanical Restoration		State Permit	
	Facility Availability (Percentage)	Facility Availability (Percentage)	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action
Trinity Reservoir												
Stuart Fork Ramps (2,320 msl)	46	~~42~~ 45	9	~~-33~~ -36	42	~~0~~ -3	41	~~-1~~ -4	42 45	0	56	~~14~~ 11
Fairview Ramp & major marina relocations (2,310 msl)	55	~~52~~ 54	18	~~-34~~ -36	52	~~0~~ –2	50	~~-2~~ –4	52 54	0	62	~~10~~ 8
Trinity Center Ramp (2,295 msl)	63	~~62~~ 63	35	~~-27~~ -28	63	~~1~~ 0	59	~~-3~~ -4	62 63	0	72	~~10~~ 9
Campground use (2,270 msl)	80	~~74~~ 78	64	~~-10~~ -14	79	~~5~~ +1	80	~~6~~ +2	74 78	0	84	~~10~~ 6
Minersville Ramp (2,170 msl)	100	~~99~~ 100	99	~~0~~ -1	100	~~1~~ 0	100	~~1~~ 0	99 100	0	100	~~1~~ 0
Shasta Reservoir												
McCloud Arm Ramps (952 msl)	93	92	89	-3	90	-2	90	-2	92	0	92	0
Sacramento Arm Ramps (950 msl)	94	92	89	-3	91	-1	92	0	92	0	92	0
Sacramento Arm Marina (937 msl)	95	93	89	-4	93	0	94	1	93	0	94	1
Pit Arm Ramps (907 msl)	98	98	93	-5	96	-2	98	0	98	0	99	1
Centimudi Ramp (844 msl)	100	100	97	-3	100	0	100	0	100	0	100	0
Folsom Reservoir												
Last boat ramp out of operation (360 msl)[c]	99	98	95	-3	98	0	98	0	98	0	98	0
Limited lake surface area (boating constrained at 400 msl)	89	87	77	-10	83	-4	86	-1	87	0	89	2
Marina closes (405 msl)	82	80	72	-8	76	-4	79	-1	80	0	83	3
Decline in campground/picnicking use (430 msl)	56	56	53	-3	53	-3	54	-2	56	0	55	-1
Beach area inundated (450 msl)	32	31	29	-2	30	-1	30	-1	31	0	31	0

Estimated Annual Recreation Use and Change in Benefits Compared to No Action	Existing Conditions	No Action	Maximum Flow		Flow Evaluation			Percent Inflow		Mechanical Restoration		State Permit	
			Amount	Percent Change from No Action	Amount	Percent Change from No Action	Percent Change from Existing Conditions	Amount	Percent Change from No Action	Amount	Percent Change from No Action	Amount	Percent Change from No Action
Trinity Reservoir													
Recreations Benefits (million $)	5.3	~~8.7~~ 8.8	8.4	~~-4~~ -5	8.8	~~1~~ 0	66	8.8	~~2~~ 1	~~8.7~~ 8.8	0	9.2	~~6~~ 5
Visitor Days[d]	484,900	~~796,200~~ 803,600	766,200	~~-4~~ -5	802,800	~~1~~ 0	66	809,700	~~2~~ 1	~~796,200~~ 803,600	0	841,000	~~6~~ 5
Shasta Reservoir													
Recreations Benefits (million $)	38.0	61.9	56.9	-8	60.4	-2	60	61.8	0	61.9	0	63.1	2
Visitor Days	3,483,100	5,682,700	5,216,500	-8	5,583,400	-2	60	5,673,600	0	5,682,700	0	5,786,800	2

[a] Estimated annual recreation use and change in benefits were identified for only Trinity and Shasta Reservoirs given they were assumed to be the reservoirs most directly affected by the change in Trinity and Shasta Division operations.
[b] Long-term average water conditions.
[c] Data Source: Draft PEIS. U.S. Bureau of Reclamation, 1997.
[d] Number of recreation visitor days (RVDs).

TABLE 3-46
Property Value Impact Ranking Summary

		Compared to the No Action Alternative					Compared to Existing Conditions	
Locations/Measures	**No Action**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**	**Existing Conditions**	**Preferred Alternative**
Trinity Reservoir Rankings								
Short-term Annual Average								
Water level	~~2,298~~ 2,302	2,284	2,303	2,301	~~2,298~~ 2,302	2,311	2,302	2,303
Change in water level		~~-14~~ -18	~~+5~~ +1	~~+3~~ -1	0	~~+13~~ +9		+1
NEPA rank	~~(4)~~ (3)	(5)	(2)	~~(3)~~ (4)	~~(4)~~ (3)	(1)		
Long-term Annual Range								
Water level	~~159~~ 155	102	123	125	~~159~~ 155	151	154	123
Change in water level		~~-57~~ -53	~~-36~~ –32	~~-34~~ -30	0	~~-8~~ –4		-31
NEPA rank	(5)	(1)	(2)	(3)	(5)	(4)		
Monthly Range								
Water level	~~61~~ 66	36	60	62	~~61~~ 66	64	66	60
Change in water level		~~-25~~ -30	~~-1~~ –6	~~+1~~ -4	0	~~+3~~ –2		-6
NEPA rank	~~(3)~~ (5)	(1)	(2)	~~(4)~~ (3)	~~(3)~~ (5)	~~(5)~~ (4)		
Overall Rank:	**~~4~~ 5**	**2**	**1**	**~~3~~ 4**	**~~4~~ 5**	**3**	**n/a**	**n/a**
Shasta Reservoir Rankings:								
Short-term Annual Average								
Water level	1,016	1,006	1,013	1,015	1,016	1,018	1,018	1,013
Change in water level		-10	-3	-1	0	+2		-5
NEPA rank	(2)	(5)	(4)	(3)	(2)	(1)		
Long-term Annual Range								
Water level	109	193	125	111	109	111	108	125
Change in water level		+84	+16	+2	0	+2		+17
NEPA rank	(1)	(4)	(3)	(2)	(1)	(2)		
Monthly Range								
Water level	67	86	88	67	67	65		
Change in water level		+19	+21	0	0	-2	65	88
NEPA rank	(2)	(3)	(4)	(2)	(2)	(1)		+23
Overall Rank:	**2**	**5**	**4**	**3**	**2**	**1**	**n/a**	**n/a**
~~River Rankings~~								
~~Fish harvest~~	~~1,820~~	~~18,200~~	~~15,100~~	~~5,250~~	~~3,830~~	~~0~~	~~1,820~~	~~15,100~~
~~Change in harvest~~		~~+16,380~~	~~+13,280~~	~~+3,430~~	~~+2,010~~	~~-1,820~~		~~+13,280~~
~~NEPA rank~~	~~(5)~~	~~(1)~~	~~(2)~~	~~(3)~~	~~(4)~~	~~(6)~~	~~n/a~~	~~n/a~~

[a] Change in annual inriver natural harvest of chinook, coho, and steelhead fish populations.

TABLE 3-49
Power Resources Summary Table

CVP Operations		No Action	Percent Change from the No Action Alternative					Percent Change from Preferred Alternative	
			Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions	Existing Condition Percent Change Compared to Preferred Alternative
Operations									
Capacity (MW)	Average (1922-1990~~9~~)	1,603	-2%	0%	0%	0%	4%	1,668.50	-4%
	Dry (1928-1934)	~~1,276~~ 1,334	~~-10~~ -8%	~~-2~~ -1%	1%	0%	~~11~~ 9%	1,394.08	-10%
	Wet (1967-1971)	1,766	-2%	0%	~~0~~ -2%	0%	0%	1,778.00	-1%
Energy (GWh)[a]	Average (1922-1990~~9~~)	5,169	-21%	-6%	-3%	0%	4%	5,217.00	-6%
	Dry (1928-1934)	~~2,946~~ 3,300	-25%	-7%	~~1~~ -1%	0%	~~9~~ 7%	2,985.00	-8%
	Wet (1967-1971)	6,490	-20%	-7%	-5%	0%	3%	6,525.00	-8%
Project Use (GWh)	Average (1922-1990~~9~~)	1,394	-11%	-2%	0%	0%	1%	1,401.00	-3%
	Dry (1928-1934)	~~901~~ 990	~~-10~~ -13%	~~-6~~ -5%	0%	0%	~~8~~ 6%	882.00	-4%
	Wet (1967-1971)	1,502	0%	1%	0%	0%	0%	1,519.00	0%
Power Marketing									
Average Year Energy Available for Sale by Month (GWh)	January	192	-7%	-2%	-3%	0%	6%	201	-6%
	February	212	1%	-1%	-3%	–	6%	222	-6%
	March	235	-1%	-4%	-4%	–	4%	240	-6%
	April	300	-4%	-7%	-1%	–	3%	309	-10%
	May	473	-22%	-10%	-10%	–	3%	474	-10%
	June	541	-27%	-16%	-10%	–	2%	535	-15%
	July	609	-31%	-7%	-6%	–	4%	609	-7%
	August	492	-33%	-2%	2%	–	6%	491	-2%
	September	234	-34%	17%	12%	–	25%	236	-16%
	October	187	-58%	-22%	-10%	–	6%	194	-24%
	November	127	-41%	-13%	-5%	–	8%	131	16%
	December	176	-30%	-8%	-2%	–	7%	182	-10%
	TOTAL	3,779	-24%	-7%	-4%	0%	6%	3,825	-8%
Synthetic Dry-year Firm Load-carrying Capacity (MW)	Capability available for sale	1,229	-16%	3%	-3%	–	-2%	1,167	9%
	Generation-limited months per year with 50 MW reduction	None	6	1	2	–	–	1	–
Cost (or benefits) of Changes in Power Production Based on Value of Replacement Power ($1,000)	Bay Area	40.3%	-$10,493	-$2,242	-$2,830	–	$2,393	$1,397	~~1,397~~ -$3,639
	Other	4.2%	-$1,093	-$234	-$295	–	$249	$146	~~146~~ -$379
	Sacramento Valley	45.5%	-$11,850	-$2,532	-$3,196	–	$2,702	$1,577	~~1,577~~ -$4,110
	San Joaquin Valley	8.8%	-$2,280	-$487	-$615	–	$520	$303	~~303~~ -$791
	Trinity County	1.2%	-$321	-$69	-$87	–	$73	$43	~~43~~ -$111
	TOTAL	100.0%	-$26,037	-$5,564	-$7,023	–	$5,937	$3,466	~~3,466~~ -$9,029
Change in Cost per Unit of Electricity ($/MWh)	Average customer	–	$0.96	$0.21	$0.26	–	-$0.22	~~-$0.33~~	~~$.54~~ -$0.33
	High-allocation customer	–	$5.86	$1.25	$1.58	–	-$1.34	~~-$3.90~~	~~$5.15~~ -$3.90

[a]GWh = gigawatt hour.

TABLE 3-54
Trinity River Basin Region (Defined as Trinity County for Up-front Impacts, and Trinity and Shasta Counties for Annual Impacts ~~These Analyses~~)

Time of Impact/ Impact Measures/ Economic Sectors	Units	Comparison Bases: Existing Conditions	Comparison Bases: No Action Alternative	Action Alternatives: Maximum Flow	Action Alternatives: Flow Evaluation	Action Alternatives: Percent Inflow	Action Alternatives: Mechanical Restoration	Action Alternatives: State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Up-front Impacts		**Year 1995 Totals**	**Year 2001 Totals**							
Output/Sales	M$	344.2	350.6	6.2/5.5/3.6[a]	1.28	1.23	2.14	0	2.14	8.54
Income	M$	186.1	189.5	2.95/2.65/1.75[a]	0.66	0.63	1.11	0	1.10	4.5
Employment	Jobs	4,955	5,045	77/70/45[a]	22	21	37	0	37	127
Most Impacted Sectors:										
Construction	Jobs	375	380	18/16/11	0	0	0	0	0	5
Wholesale trade	Jobs	105	105	7/6/4[a]	1	1	2	0	2	2
Eating & drinking	Jobs	225	230	8/7/4[a]	3	3	5	0	5	10
Auto & service stations	Jobs	55	55	11/10/6[a]	0	0	0	0	0	0
Annual Impacts		**Year 1995 Totals**	**Year 2020 Totals**							
Output/Sales	M$	6,078.2	8,693.7	~~-6.3~~ -6.6	~~3.2~~ 3.0	~~-0.5~~ -0.8	~~-0.11~~ 0.13	~~-5.9~~ -6.2	~~3.2~~ 3.0	~~2,618.7~~ 2,618.5
Income	M$	3,377.4	4,830.7	~~-2.6~~ -2.7	~~2.0~~ 1.8	~~-0.3~~ -0.4	~~-0.06~~ 0.07	~~-3.5~~ -3.6	~~2.0~~ 0.8	~~1,455.3~~ 1,455.1
Employment	Jobs	83,280	119,110	-66 -70	66 62	-8 -12	2	-115 -119	66 62	35,896 35,892
Most Impacted Sectors:										
Wholesale trade	Jobs	4,900	7,010	-9	2	-1	0	-4	2	2,112
Retail trade	Jobs	15,880	22,710	~~-25~~ -26	~~21~~ 20	~~-3~~ -4	1	~~-38~~ -39	~~21~~ 20	~~6,851~~ 6,850
Lodging places	Jobs	1,440	2,060	~~-5~~ -6	~~20~~ 19	~~-1~~ -2	1	~~-32~~ -33	~~20~~ 19	~~640~~ 639

[a]Three estimates reflect dam modification options. See Section 2.1.3.
M$ = million dollars.

TABLE 3-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Monterey Coastal Area										
Total output	M$	34,214.6	51,714.2	0	0	0	0	-13.3	0	17,499.6
Income	M$	19,297.0	29,166.8	0	0	0	0	-5.4	0	9,869.8
Employment	Jobs	473,210	715,190	0	0	0	0	-166	0	241,980
Most Impacted Sectors:										
Commercial fishing	Jobs	210	210	0	0	0	0	-27	0	0
Seafood processing	Jobs	2,450	2,450	0	0	0	0	-57	0	0
Wholesale trade	Jobs	18,920	28,600	0	0	0	0	-8	0	9,680
Retail trade	Jobs	77,010	116,390	0	0	0	0	-24	0	39.380
Lodging places	Jobs	12,390	18,720	0	0	0	0	-2	0	6,330
San Francisco Coastal Area										
Total output	M$	351,700	430,900	-159.6	-32.6	-12.3	2.28	13.2	-32.6	79,167
Income	M$	199,900	245,000	-79.2	-16.2	-6.4	0.91	7.9	-16.2	45,084
Employment	Jobs	3,652,600	4,560,500	-1,540	-310	-120	25	110	-310	907,590
Most Impacted Sectors:										
Vegetables	Jobs	1,423	1,776	-165	-1	-9	0	27	-1	352
Canned fruit and vegetables	Jobs	3,281	4,097	-125	-24	-7	0	21	-24	792
Retail and wholesale trade	Jobs	746,600	932,218	-327	-65	-30	6	21	-65	185,553
Services	Jobs	1,154,925	1,441,977	-420	-85	-41	6	38	-85	286,967
Commercial Fishing	Jobs	1,276	1,593	3	0	-3	3	-20	0	317
Mendocino Coastal Area										
Total output	M$	3,111.5	4,267.1	11.1	9.6	4.9	4.3	-2.1	9.6	1,165.2
Income	M$	1,560.4	2,140.0	5.1	4.4	2.3	2.0	-1.0	4.4	584.0
Employment	Jobs	43,630	59,835	127	110	57	50	-25	110	16,315

TABLE 3-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Most Impacted Sectors:										
Commercial fishing	Jobs	180	180	33	29	14	13	-5	29	29
Seafood processing	Jobs	180	180	31	27	13	12	-5	27	27
Wholesale trade	Jobs	1,360	1,870	6	5	3	2	-1	5	515
Retail trade	Jobs	8,130	11,150	18	15	8	7	-5	15	3,035
Lodging places	Jobs	1,710	2,350	2	2	1	1	-1	2	642
KMZ-California Coastal Area										
Total Output	M$	5,086.9	6,072.5	3.0	2.9	2.0	1.9	-0.3	2.9	988.5
Income	M$	2,752.4	3,285.7	1.5	1.5	1.0	0.9	-0.2	1.5	534.8
Employment	Jobs	73,760	88,050	37	36	24	23	-4	36	14,326
Most Impacted Sectors:										
Commercial fishing	Jobs	520	520	8	7	5	5	-1	7	7
Seafood processing	Jobs	460	460	7	6	4	4	-1	6	6
Wholesale trade	Jobs	3,210	3,830	2	2	2	1	0	2	622
Retail trade	Jobs	13,820	16,490	8	8	5	5	-1	8	2,678
Lodging places	Jobs	1,390	1,650	2	2	1	1	0	2	262
KMZ-Oregon Coastal Area										
Total Output	M$	572.4	848.4	3.9	3.7	2.8	2.6	-0.5	3.7	279.7
Income	M$	289.9	429.7	1.7	1.6	1.2	1.0	-0.2	1.6	141.4
Employment	Jobs	9,100	13,490	62	58	45	43	-8	58	4,448
Most Impacted Sectors:										
Commercial fishing	Jobs	130	130	13	12	9	8	-1	12	12
Seafood processing	Jobs	110	110	9	8	6	6	-1	8	8
Wholesale trade	Jobs	330	490	4	3	3	3	0	3	163
Retail trade	Jobs	2,080	3,080	18	17	14	13	-3	17	1,017
Lodging places	Jobs	500	740	3	3	3	2	-1	3	243

TABLE 3-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Northern/Central Oregon Coastal Area										
Total output	M$	20,757.5	27,094.0	51.1	47.5	36.0	35.7	-41.8	47.5	6,384.0
Income	M$	10,549.2	13,768.8	19.3	17.9	13.6	~~15.4~~ 13.4	-15.8	17.9	3,237.5
Employment	Jobs	290,960	379,760	601	559	423	419	-494	559	89,559
Most Impacted Sectors:										
Commercial fishing	Jobs	900	900	109	102	77	74	-89	102	102
Seafood processing	Jobs	1,730	1,730	181	168	127	127	-147	168	168
Wholesale trade	Jobs	11,260	14,700	36	34	26	26	-30	34	3,474
Retail trade	Jobs	56,410	73,630	92	86	65	64	-77	86	17,306
Lodging places	Jobs	6,370	8,320	6	5	4	4	-5	5	1,955

M$ = million dollars.

TABLE 4-3A
Modeling Assumptions

	Pre-CVPIA	**Bay-Delta WQCP**	**3406 (b)(2)**	**Preferred Alternative**
Trinity River Minimum Instream Flow Requirement	340 taf annual minimum instream flow pattern all year classes	340 taf annual minimum instream flow pattern all year classes	340 taf annual minimum instream flow pattern all year classes	360-815 taf depending on year type
Sacramento River Operations	SWRCB Water Rights Orders 90-05 and 91-01; NMFS Winter-run Biological Opinion	SWRCB Water Rights Orders 90-05 and 91-01; NMFS Winter-run Biological Opinion	SWRCB Water Rights Orders 90-05 and 91-01; NMFS Winter-run Biological Opinion; Nov. 20, 1997, Administrative Paper Actions	SWRCB Water Rights Orders 90-05 and 91-01; NMFS Winter-run Biological Opinion; Nov. 20, 1997, Administrative Paper Actions
Delta Operations	SWRCB Decision 1485 and NMFS Winter-run Biological Opinion	NMFS Winter-run Biological Opinion and SWRCB Water Rights Order 95-06 (Bay-Delta Accord)	NMFS Winter-run Biological Opinion; SWRCB Water Rights Order 95-06 (Bay-Delta Plan Accord); Nov. 20, 1997, Administrative Paper Actions[a].	NMFS Winter-run Biological Opinion; SWRCB Water Rights Order 95-06 (Bay-Delta Plan Accord); Nov. 20, 1997, Administrative Paper Actions[a].
CVP Contract Allocations Ag/M&I/Refuges/ Water Rights	Ag minimum water deliveries can go to zero percent. M&I can go to 75 percent. Refuges cut like Ag. Water Rights only cut in critical year's deliveries to 75 percent.	Ag minimum water deliveries can go to zero percent. M&I can go to 50 percent. Water rights and refuges only cut in critical year's deliveries to 75 percent.	Ag minimum water deliveries can go to zero percent. M&I can go to 50 percent. Water rights and refuges only cut in critical year's deliveries to 75 percent.	Ag minimum water deliveries can go to zero percent. M&I can go to 50 percent. Water Rights and refuges only cut in critical year's deliveries to 75 percent.

[a]The 1999 3406(b)(2) decision required some accounting and post-processing; additional Delta actions were required to meet the 800 taf. Assumed restricted pumping that affected the south of Delta users.

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		Water Resources	
Groundwater			
Maximum Flow Flow Evaluation Percent Inflow	Significant declines in groundwater levels could occur in the Sacramento Valley and Tulare Basin regions, primarily in areas receiving CVP agricultural service contract water.	Although changes to surface water supply *per se* were not considered an impact, the development of additional water supplies to meet demands would lessen the associated impacts (e.g., groundwater impacts). A number of demand- and supply-related programs are currently being studied across California, many of which are being addressed through the ongoing CALFED and CVPIA programs and planning processes. Although none of these actions would be directly implemented as part of the alternatives discussed in this DEIS/EIR, each could assist in offsetting impacts resulting from decreased Trinity River exports. Examples of actions being assessed in the CALFED and CVPIA planning processes include: • Develop and implement additional groundwater and/or surface-water storage. Such programs could include the construction of new surface reservoirs and groundwater storage facilities, as well as expansion of existing facilities. Potential locations include sites throughout the Sacramento and San Joaquin Valley watersheds, as well as the Delta. • Purchase long- and/or short-term water supplies from willing sellers (both in-basin and out-of-basin) through actions including, but not limited to, temporary or permanent land fallowing. • Facilitate willing buyer/willing seller inter- and intra-basin water transfers that derive supplies from activities such as conservation, crop modification, land fallowing, land retirement, groundwater substitution, and reservoir re-operation. • Promote and/or provide incentive for additional water conservation to reduce demand. • Decrease demand through purchasing and/or promoting the temporary fallowing of agricultural lands. • Increase water supplies by promoting additional water recycling.	Significant

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Maximum Flow Flow Evaluation Percent Inflow	The groundwater level declines could result in increased land subsidence within limited areas within the San Joaquin Valley and Tulare Basin regions.	See above.	Significant
Maximum Flow Flow Evaluation Percent Inflow	Additional groundwater pumping could result in upwelling of groundwater high in ~~TSD~~ TDS into productive groundwater zones within limited areas within the San Joaquin Valley and Tulare Basin regions.	See above.	Significant
		Water Quality	
Flow Evaluation Mechanical Restoration Percent Inflow	The channel rehabilitation projects would result in short-term Trinity River turbidity impacts.	• A 401 water quality certification would be obtained from the NCRWQCB, and a construction procedure would be developed to meet the Basin Plan turbidity requirements. Monitoring would be conducted as specified by the NCRWQCB, and efforts would be taken to reduce levels if they are 20 percent or more over background (e.g., isolating the work area and/or slowing or halting construction until the 20-percent level is achieved). • Notify individual diverters with state diversion permits within 2 miles downstream of any mechanical channel rehabilitation activity at least 2 days in advance of activities likely to produce turbidity.	Less than significant
Maximum Flow Flow Evaluation Percent Inflow	Violate temperature objectives and carryover storage criteria established in the Sacramento River winter run chinook salmon Biological Opinion.	Significant[a] impacts identified for the increased frequency of temperature and carryover storage violations ~~would need to be~~ were evaluated by ~~the~~ NMFS. ~~Such consultation could result in modification of the existing Biological Opinion. Given the result of this consultation is unknown, this significant impact is considered to be unmitigable at this time.~~ See mitigation for water quality fish-related impacts under Fishery Resources. (See also water supply related impacts under Groundwater.)	Significant[a]
Maximum Flow Percent Inflow State Permit	Violate state temperature objectives established for the Trinity River.	Significant impacts identified for violation of state temperature objectives would be evaluated by the NCRWQCB. Consultation with NMFS would occur pursuant to Trinity River coho salmon. Bypassing the Trinity Powerplant could offset impacts to temperature in the Trinity River. Preliminary analysis of powerplant bypasses indicates that pulling colder water from lower in the reservoir could alleviate temperature impacts. Further evaluation of the benefits and costs would be needed before a full assessment could be made. Given the result of consultations and bypass analysis is unknown, this significant impact is considered to be unmitigable at this time.	Significant

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Maximum Flow Percent Inflow State Permit	Violate Hoopa Valley Tribe temperature objectives established for the Trinity River.	Significant impacts identified for violation of tribal temperature objectives would be evaluated by the Hoopa Valley EPA. Consultation with NMFS would occur pursuant to Trinity River coho salmon. Bypassing the Trinity Powerplant could offset impacts to temperature in the Trinity River. Preliminary analysis of powerplant bypasses indicates that pulling colder water from lower in the reservoir could alleviate temperature impacts. Further evaluation of the benefits and costs would be needed before a full assessment could be made. Given the result of consultations and bypass analysis is unknown, this significant impact is considered to be unmitigable at this time.	Significant
		Fishery Resources	
Native Anadromous Species			
State Permit	Would affect native anadromous species utilizing the Trinity River due to inadequate habitat conditions and water temperature.	Anticipated significant impacts to native anadromous salmonids in the Trinity River from implementation of this alternative would be unmitigatable.	Significant
Maximum Flow Flow Evaluation Percent Inflow	Violate temperature objectives and carryover storage criteria established in the Sacramento River winter run chinook salmon Biological Opinion.	(See mitigation for water quality related impacts under Water Quality.) ~~Consult with NMFS and implement any required conservation measures. Given the result of this consultation is unknown, this significant impacts is considered to be unmitigable at this time.~~ Significant impacts requiring mitigation for adverse effects to anadromous salmonids in the Sacramento River system associated with Maximum Flow and Percent Inflow Alternatives would need to be addressed during reconsultation with NMFS. Significant impacts related to temperature objectives and carryover storage criteria established in the Sacramento River winter-run chinook salmon BO for the Flow Evaluation (Preferred Alternative) were addressed through reconsultation under ESA with NMFS. Per the NMFS' Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize Southern Oregon/Northern California Coast (SONCC) coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, or Central Valley steelhead. The NMFS does anticipate that SONCC coho salmon habitat adjacent to and downstream of the channel rehabilitation projects associated with the Preferred Alternative may be temporarily degraded during construction. Construction of these projects, which will create a substantial amount of additional suitable habitat, may temporarily displace an unknown number of juvenile coho salmon but is not	Significant[a]

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		expected to result in a lethal take. The NMFS does not anticipate that the implementation of the proposed action will incidentally take Central Valley spring-run chinook or Central Valley steelhead, but that the Preferred Alternative will result in a minute increase in the level of Sacramento River winter-run chinook incidentally taken in all years except critically dry years. In such years, Reclamation would be required to reinitiate consultation per the existing Winter-run Central Valley Project Operations Criteria and Plan to develop year-specific temperature control plans. Implementation of the following reasonable and prudent measures specified in the NMFS BO to minimize the effects of incidental take shall be non-discretionary and will result in minimizing impacts of incidental take of SONCC coho salmon and Sacramento River winter-run chinook salmon in all years including critically dry years: The Service and Reclamation shall: 1. Implement the flow regimes included in the proposed action (as described in the DEIS/EIR, page 2-19, Table 2-5) as soon as possible. 2. Ensure that NMFS is provided the opportunity to be represented during implementation of the Adaptive Environmental Assessment and Management program. 3. Ensure that the replacement bridges and other infrastructure modifications, needed to fully implement the proposed flow schedule, are designed and completed as soon as possible. 4. Periodically coordinate with NMFS during the advanced development and scheduling of the habitat rehabilitation projects described in the DEIS/EIR. 5. Complete “the first phase of the channel rehabilitation projects” (U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, 2000) in a timely fashion. 6. Implement emergency consultation procedures during implementation of flood control or “safety of dams” releases from Lewiston Dam to the Trinity River.	

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		7. In dry and critically dry water-year classes, Reclamation and Service shall work cooperatively with the upper Sacramento River Temperature Task Group to develop temperature control plans that provide for compliance with temperature objectives in both the Trinity and Sacramento Rivers. Implementation of these measures will be non-discretionary.	
Resident Native and Non-native Fish			
State Permit	Increased water temperatures, which would reduce non-native Trinity River fish habitat.	Anticipated significant impacts to resident fish in the Trinity River from implementation of this alternative would be unmitigatable.	Significant
Maximum Flow Flow Evaluation Percent Inflow	Impacts to Delta smelt and Sacramento splittail as a result of changes in Delta inflow to export ratios.	~~Consult with Service and implement any required conservation measures. Given the result of this consultation is unknown, this significant impact is considered to be unmitigable at this time.~~ Significant impacts requiring mitigation related to changes in Delta inflow and export ratios associated with Maximum Flow and Percent Inflow Alternatives would need to be addressed during reconsultation with NMFS. Significant impacts related to changes in Delta inflow and export ratios for the Flow Evaluation (Preferred Alternative) were addressed through consultation under ESA with the Service. Per the Service's Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize delta smelt and Sacramento splittail or adversely modify critical habitat for delta smelt. The Service has concurred with the determination that implementing the Preferred Alternative will not likely adversely affect the bald eagle and northern spotted owl. It is anticipated that delta smelt and Sacramento splittail will be adversely affected by implementing the Preferred Alternative and that incidental take may be affected in manner or extent not analyzed in the March 6, 1995 Biological Opinion on the Long-term Operation of the CVP and SWP. Therefore, the following reasonable and prudent measure to minimize the effects of incidental take was developed: 1. U.S. Bureau of Reclamation (Reclamation) shall minimize the effects of reoperating the Central Valley Project resulting from the implementation of the Preferred Alternative within the Trinity River Basin on listed fish in the Delta. Implementation of this measure will be non-discretionary.	Significant[a]

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Reservoirs			
Maximum Flow	Impacts to largemouth and smallmouth bass spawning in Trinity Reservoir due to reduced water surface levels.	A smallmouth and largemouth bass stocking program shall be instituted similar to the existing stocking program for coldwater species.	Less than significant
Ocean Fisheries Economics			
State Permit	Reduced angler benefits and net income of charter boat operators in the Mendocino Region.	No mitigation is available.	N/A
State Permit	Reduced commercial fishing harvests and related economic benefits.	No mitigation is available.	N/A
		Tribal Trust	
State Permit	Reduced flows would lead to further decline in tribal access to trust resources.	No mitigation is available.	Significant
		Vegetation, Wildlife, and Wetlands	
Vegetation			
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Ground disturbing activities could result in a loss of vegetation and special-status plant populations.	Conduct site-specific environmental reviews prior to mechanical ground-disturbing activities. Such reviews shall, when appropriate, include surveys for federal and state endangered, threatened, and proposed species, or for other species if required by permitting agencies (e.g., USFS). If such species are present, actions shall be taken to avoid impacts. Develop and implement a revegetation plan for all ground-disturbing activities (excluding channel rehabilitation sites). Revegetation shall use plant species found adjacent to the impact area or from similar habitats, subject to landowner and/or agency concurrence. Replacement ratios and monitoring plans, if determined necessary, will be developed in cooperation with the Corps, Service, and CDFG.	Less than significant
State Permit	Further degradation of riparian vegetation due to reduced flows.	No mitigation is available.	Significant
Wildlife			
Flow Evaluation Percent Inflow Mechanical Restoration	Direct mortality of foothill yellow-legged frogs or egg masses, adult western pond turtles and hatchlings, or willow flycatcher	Conduct site-specific environmental reviews prior to mechanical ground-disturbing activities. Such reviews shall, when appropriate, include surveys for federal and state endangered, threatened, and proposed species, or for	Less than significant

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
	nests and young during construction (and maintenance for the Mechanical Restoration) of the channel rehabilitation sites.	other species if required by permitting agencies (e.g., USFS). If such species are present, actions shall be taken to avoid impacts (e.g., delay construction until after willow flycatcher chicks fledge).	
State Permit	Continued degradation and reduction of habitat as a result of reduced flows.	No mitigation is available.	Significant
Wetlands			
Flow Evaluation Percent Inflow Mechanical Restoration	The mechanical channel rehabilitation projects could impact wetland resources.	Conduct pre-construction delineation of wetland areas at sites that may contain wetlands. Consult with the Corps on potential impacts to wetland resources. No mitigation is available.	Less than significant
		Recreation	
Riverine			
Maximum Flow Flow Evaluation Mechanical Restoration State Permit Percent Inflow	Impacts from flows to a number of recreation activities for at least a portion of the recreation season.	Flow-related significant impacts would be unmitigable without changing the flow release schedule which is inherent to the alternative.	Significant
Maximum Flow Flow Evaluation State Permit Percent Inflow	Impacts to public safety from river flows that are too high or too low (i.e., outside the preferred range for boating).	Post signs at river access points showing daily flows. Offer a toll-free tele-phone number so recreationalists can call to obtain daily flow information. Post daily flows on the Internet.	Less than significant
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Impacts to recreation activities from turbidity associated with the construction (and maintenance for Mechanical Restoration) of the channel rehabilitation sites.	(See mitigation for water quality related impacts under Water Quality.)	Less than significant
Reservoirs			
Maximum Flow Flow Evaluation	Increase the frequency at which Trinity Reservoir boat ramps are unusable, which would indirectly impact marinas and campgrounds.	All affected boat ramps should be extended a sufficient distance to accom-modate the new water levels. Marina owners should be compensated for additional costs associated with moving their facilities or to construct new facilities to accommodate the new water levels. Campground facilities should be modified or funding provided to accom-modate the revised operational approach.	Less than significant

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		Land Use	
Residential/Municipal and Industrial			
Maximum Flow Flow Evaluation Percent Inflow	Increased flooding of Trinity River structures and/or residences.	Property owners could be compensated at fair market value for all flood-related structure/improvement losses incurred, or funding would be provided to retrofit structures/improvements to withstand peak flows. Property owners who have parcels with buildable sites outside of the current 100-year floodplain that would be regularly inundated could be compensated at fair market value for the loss of development rights to that parcel. Given funding for these efforts is not yet been determined, this significant impact is considered to be unmitigable at this time.	Significant
Maximum Flow	Potentially significant M&I related impacts as a result of decreased surface-water supplies.	(See water supply related impacts under Groundwater.)	Significant
Agriculture			
Maximum Flow Flow Evaluation	Substantially decrease irrigated acreage within the San Felipe Unit.	(See water supply related impacts under Groundwater.)	Significant
		Power	
Maximum Flow Flow Evaluation Percent Inflow	Potentially significant power-related impacts from decreased surface-water supplies.	(See water supply related impacts under Groundwater.~~)~~ Power-related benefits associated with such programs would only occur if operations were conducted to provide increased generation; otherwise, implementation of such programs could negatively affect power resources). Operating criteria would be established to allow Western to respond to various emergency situations in accordance with their obligations to the North American Electric Reliability Council. This commitment would also provide for exemptions to a given alternative's operating criteria during search and rescue situations, special studies and monitoring, dam and powerplant maintenance, and spinning reserves. Such exemptions for responding to various emergency situations would be consistent with the Presidential Memorandum, dated August 3, 2000, directing federal agencies to work with the State of California to develop procedures governing the use of backup power generation in power shortage emergencies.	Significant

TABLE 4-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		Cultural Resources	
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Impacts to cultural resources.	Conduct cultural resource surveys of project areas (including areas of ancillary activities, such as staging areas, gravel mining areas, etc.) prior to ground disturbance. Areas containing cultural resources shall be demarcated and activities planned to avoid these areas. If cultural resources cannot be avoided, additional research or test excavations (as appropriate) will be undertaken to determine whether the resources meet CEQA and/or NRHP significance criteria. Unavoidable impacts on significant resources would be mitigated for in a manner that is deemed appropriate. Mitigation for significant resources may include, but is not limited to, data recovery, public interpretation, performance of a Historic American Building Survey or Historic American Engineering Record, or preservation by other means.	Less than significant
		Air Quality	
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Spawning gravel placement and other heavy equipment work associated with the alternatives would result in potentially significant PM_{10} impacts as a result of fugitive dust.	Implement a dust control program, which includes: watering of stockpiles, roads, etc. as necessary, and identify an individual to monitor dust control and to respond to citizen complaints.	Less than significant

[a]These impacts were identified as "significant" per the CEQA-related significance threshold standards described in Chapter 3.

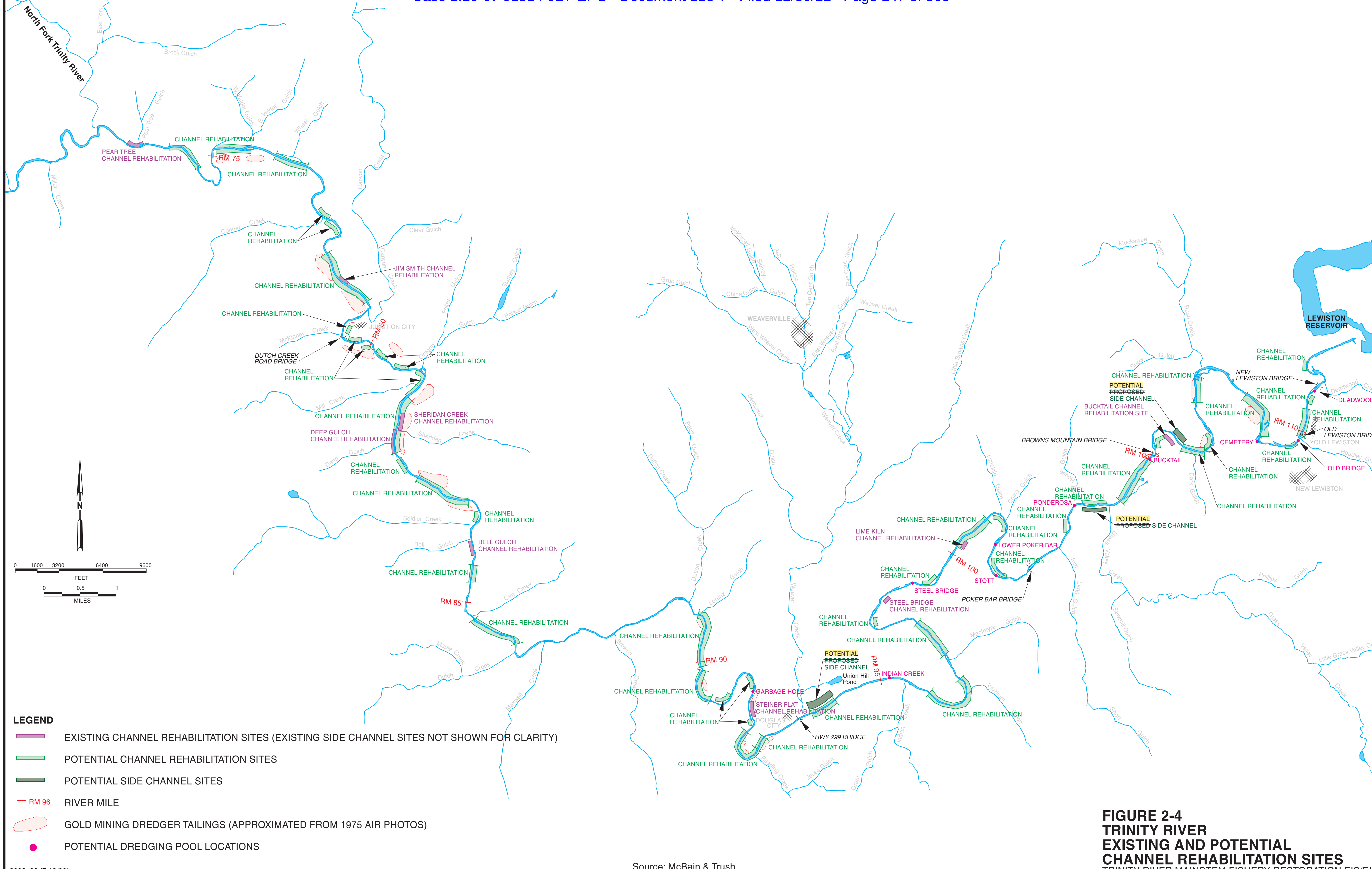
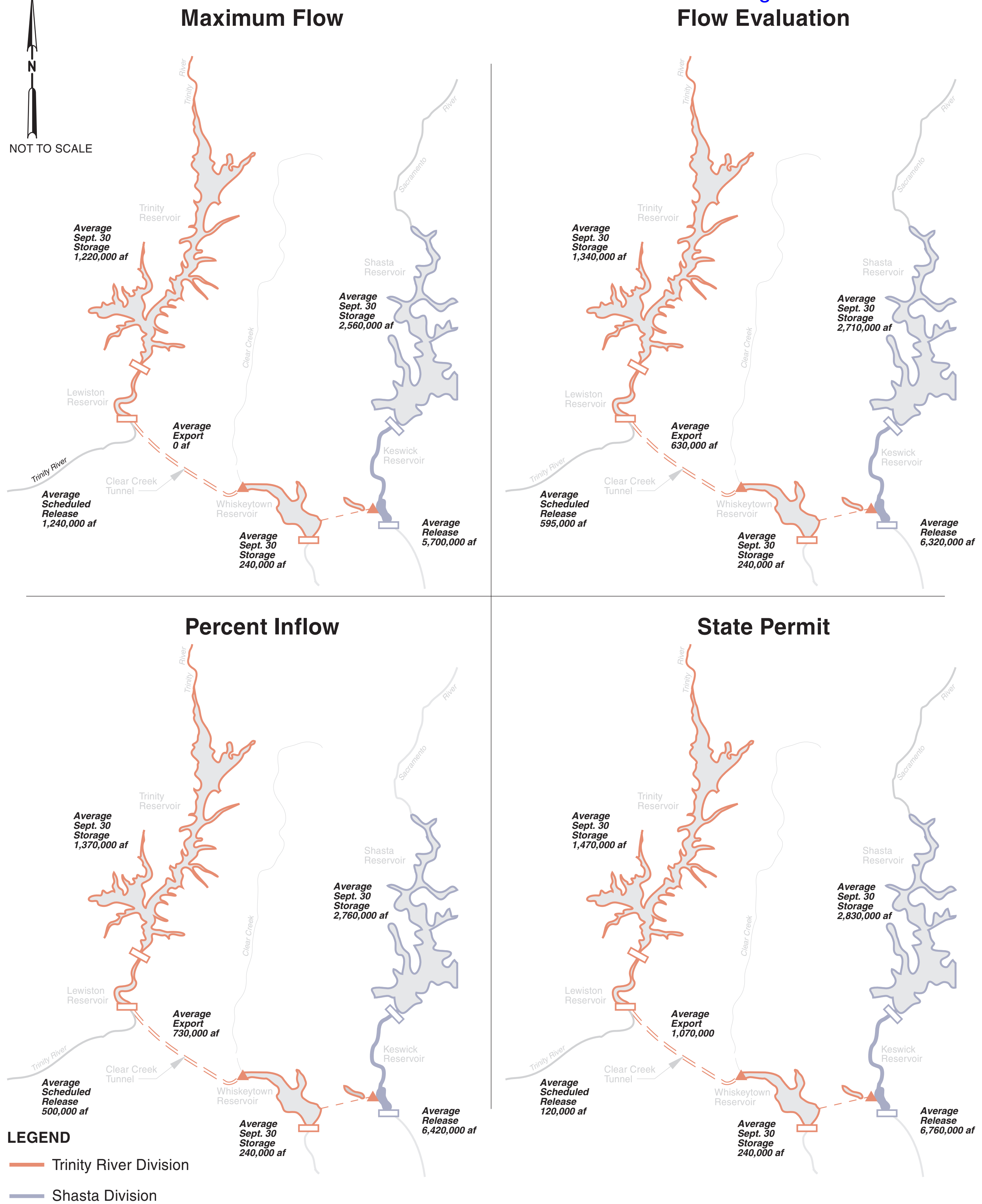


FIGURE 2-4
TRINITY RIVER
EXISTING AND POTENTIAL
CHANNEL REHABILITATION SITES
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR



NOTES:

1. Numbers derived from PROSIM simulation including spills.
2. Reservoir storage represents instantaneous storage on September 30. Average annual releases represent the volume of water released over the average water year. An increase in instream releases does not result in a one-for-one reduction in exports because of operational constraints such as flood releases and other periodic operations.

3003_330 (6/27/00)

FIGURE 2-8
LONG-TERM AVERAGE ANNUAL EXPORTS AND RELEASES FOR MAXIMUM FLOW, FLOW EVALUATION, PERCENT INFLOW, AND STATE PERMIT ALTERNATIVES
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

Compare to Figure 3-7: Note exposed gravel bars, channel migration into dredge tailings, and patches of riparian vegetation away from low-flow channel margins.

NOT TO SCALE

3003_250 (6/28/00)

FIGURE 3-5
1960 AERIAL PHOTO OF JUNCTION CITY
PRE-DAM GEOMORPHOLOGY
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

Compare to Figure 3-5: Note thick band of mature riparian vegetation along low-flow channel and separation of low-flow channel to exposed gravel bars and floodplains.

NOT TO SCALE

3003_31 (6/23/00)

FIGURE 3-7
1989 AERIAL PHOTO OF JUNCTION CITY
POST-DAM GEOMORPHOLOGY
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

FIGURE 3-8
FLOWS REQUIRED FOR CREATION OF ALLUVIAL RIVER ATTRIBUTES
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

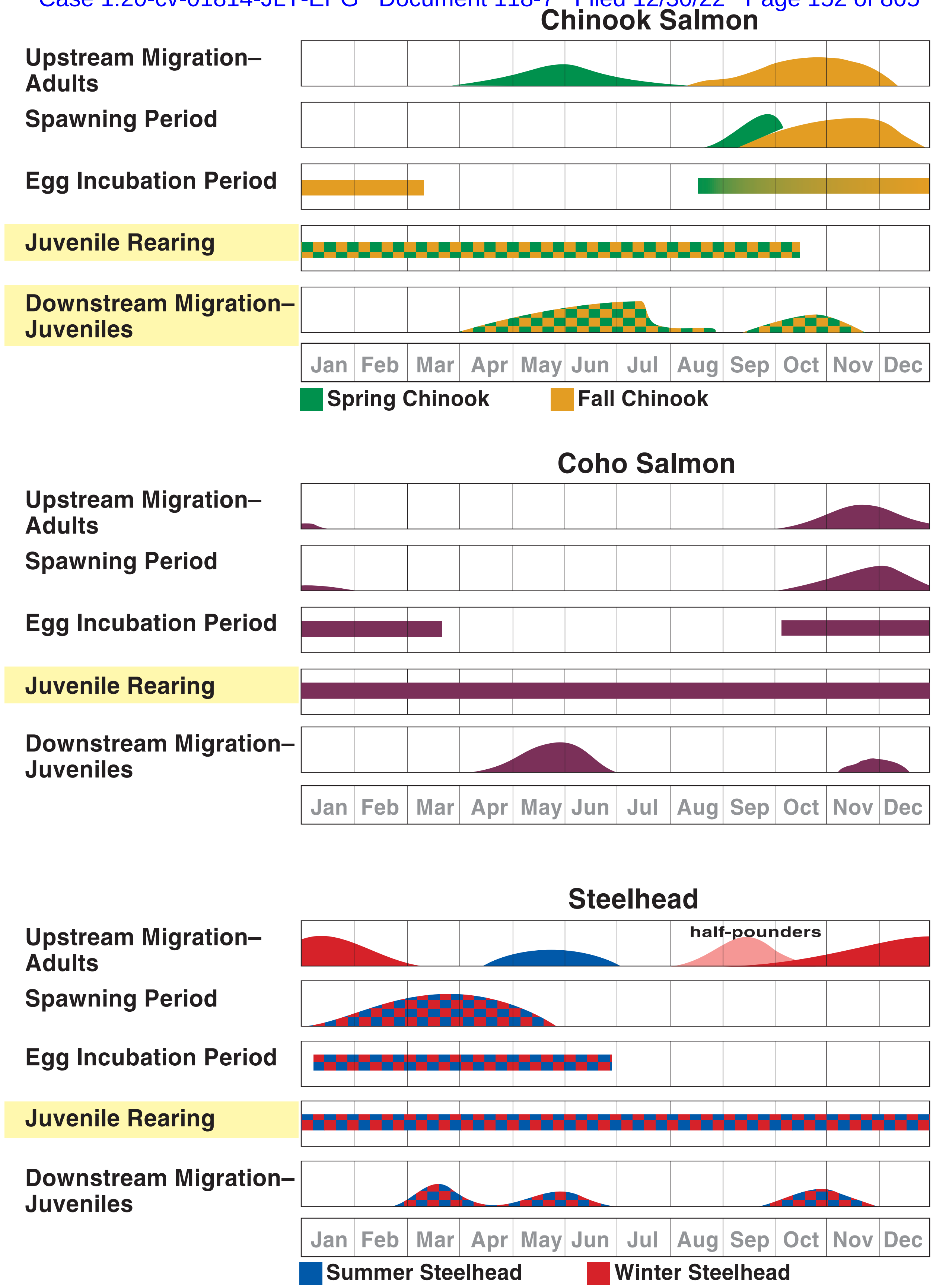


FIGURE 3-35
TEMPORAL DISTRIBUTION OF ANADROMOUS SALMONID REPRODUCTION
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

3003_301 (6/29/00)

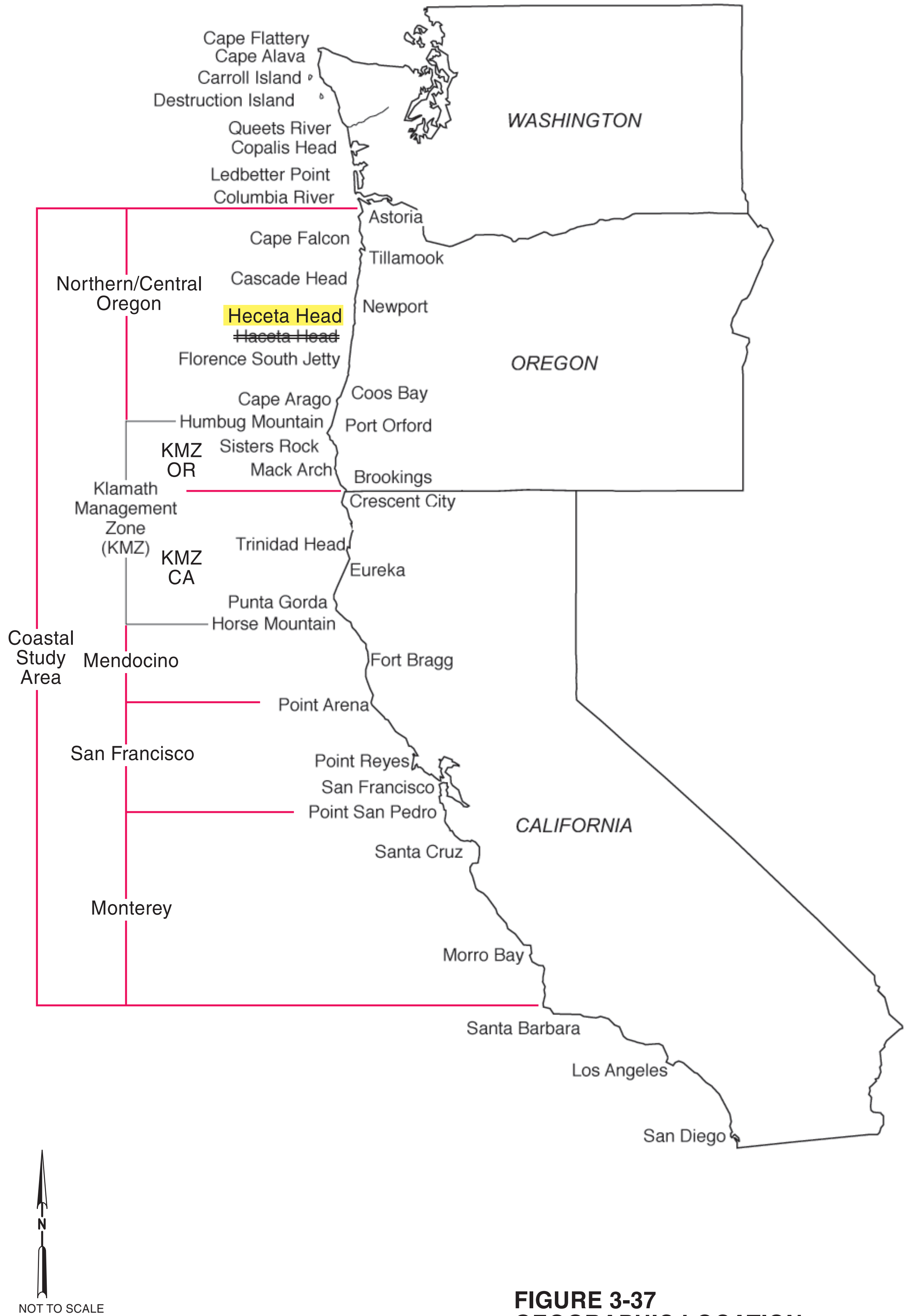
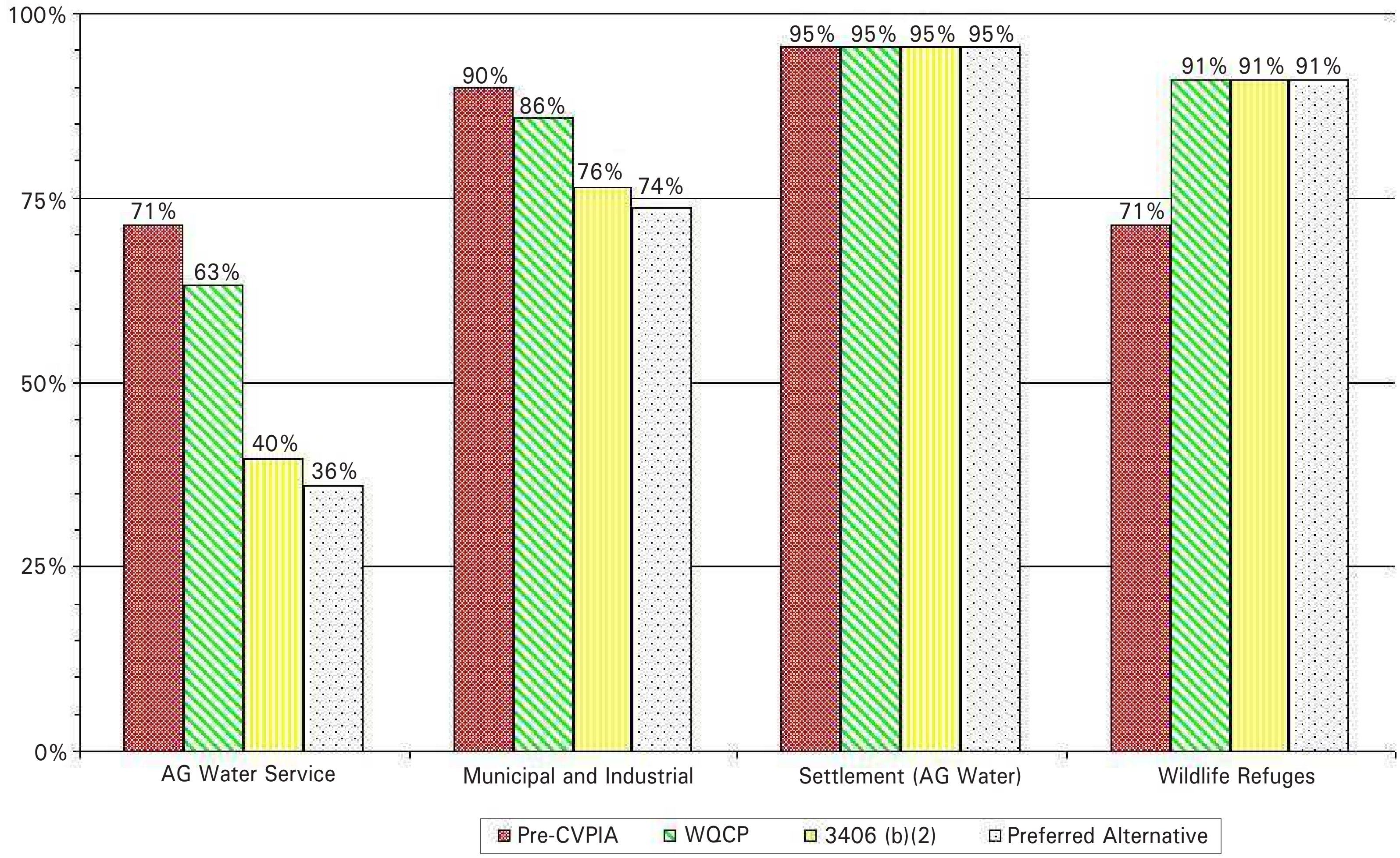


FIGURE 3-37
GEOGRAPHIC LOCATION OF COASTAL STUDY AREA
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

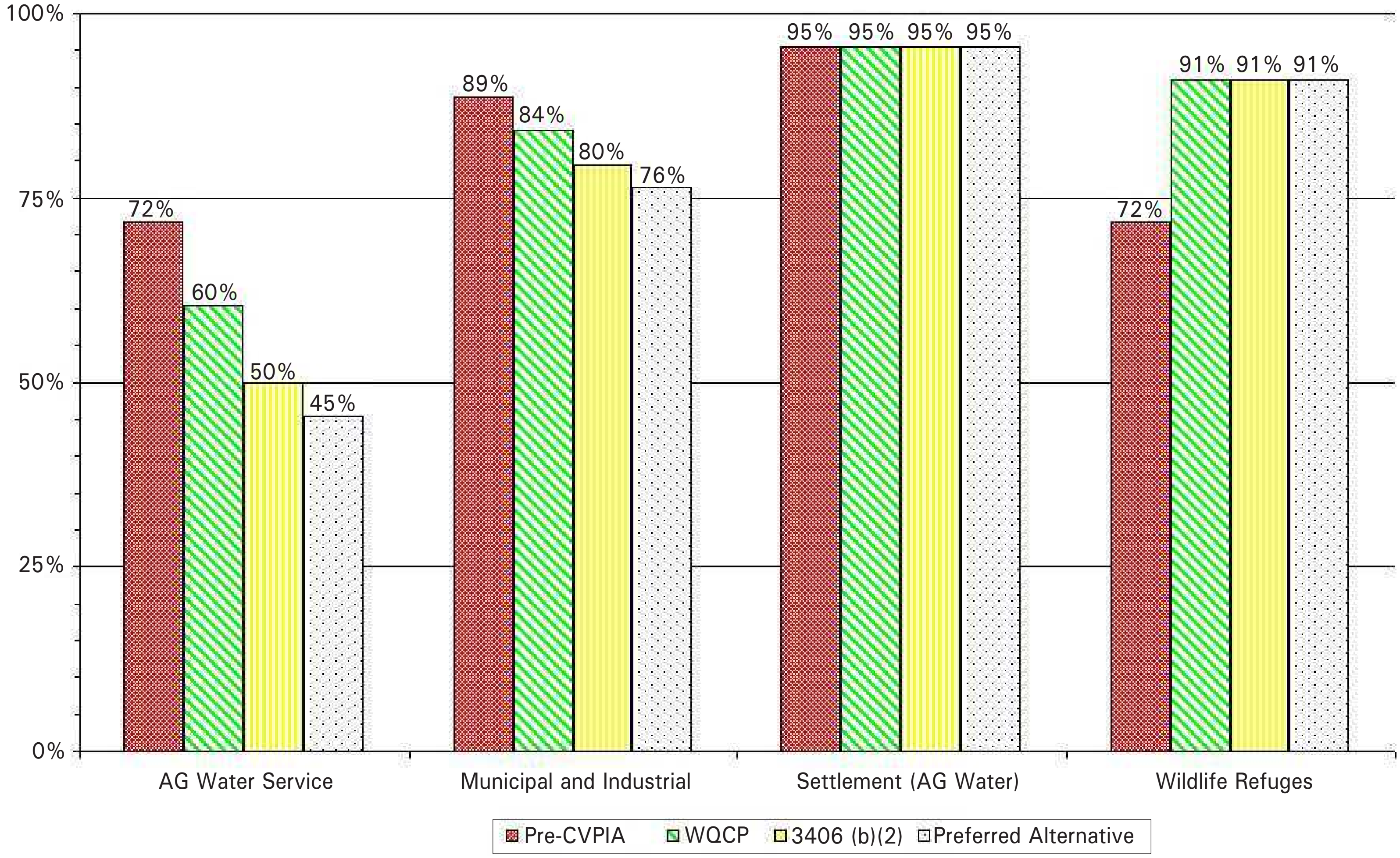
3003_390 (7/12/00)



02/15/2000

FIGURE 4-6
PROSIM AVERAGE (1983-1993)
CVP ALLOCATIONS SOUTH OF THE DELTA
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

3003_998 (7/7/00)



02/15/2000

FIGURE 4-7
PROSIM AVERAGE (1983-1993)
CVP ALLOCATIONS NORTH OF THE DELTA
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

3003_999 (7/7/00)

2.4 Changes to the DEIS/EIR—Technical Appendices

2.4.1 Technical Appendix A—Water Resources/Water Quality

1.1 Surface-water Hydrology *(SEE SUBSECTIONS)*

1.1.1 Affected Environment **(CHANGES FOLLOW)**
pgs. A-2 through A-4

Table A-1A has been modified to more accurately represent dry-year Delta inflow when comparing the Preferred Alternative to existing conditions. See Section 2.4.1.1 for revised Table A-1A.

1.1.2 Environmental Consequences *(SEE SUBSECTIONS)*

1.1.2.1 Methodology **(CHANGES FOLLOW)**
p. A-8

At the 2020 level of development, ~~annual~~ CVP contracts total approximately ~~6.6~~ 6.5 million acre-feet (maf) per year north and south of the Delta. The CVP contracts consist of agricultural water service contracts, municipal and industrial (M&I) water service contracts, exchange contracts, water rights contracts, and refuge water supplies. At the 2020 level of development, ~~annual~~ SWP entitlements amount to approximately 4.2 maf per year, and the variable demands range from 3.4 - 4.2 maf per year.

1.1.2.2 Significance Criteria *(NO CHANGE)*
1.1.2.3 No Action *(NO CHANGE)*

1.1.2.4 Maximum Flow Alternative **(CHANGES FOLLOW)**
pg. A-9

Under this alternative, diversions from the TRD to the Central Valley would be eliminated. In comparison to the No Action Alternative, simulated long-term average annual releases from Keswick Reservoir would be reduced by approximately 860,000 af or 13 percent. Releases from Keswick Reservoir include releases from Shasta Reservoir and Spring Creek diversions. In comparison to the No Action Alternative, simulated long-term average annual delta inflow would be reduced by about ~~780,000~~ 790,000 af, or ~~3~~ 4 percent, and simulated long-term average annual Delta outflow would be reduced by about 420,000 af or 3 percent.

1.1.2.5 Flow Evaluation Alternative **(CHANGES FOLLOW)**
pg. A-10

This alternative was designed to use a mix of flow and non-flow measures to promote the restoration of Trinity River geomorphology and natural habitat. The differences between Flow Evaluation Alternative and ~~existing condition~~ No Action Alternative simulation instream flow releases are presented by water-year class in Table A-3.

Table A-3 has been modified to more accurately represent total acre-feet during the normal water-year class under the Flow Evaluation Alternative. See Section 2.4.1.1 for revised Table A-3.

Under this alternative, diversions from the TRD to the Central Valley would be reduced due to increased instream flow releases and increased minimum Trinity Reservoir storage levels. In comparison to the ~~existing conditions~~ No Action Alternative simulation, the pattern of diversions from the TRD would be shifted from a spring and summer emphasis to a summer and fall emphasis to help meet Trinity River instream temperature requirements. Simulated long-term average annual diversions from the TRD in the Flow Evaluation Alternative would be reduced by about 240,000 af, or 28 percent. In comparison to the ~~existing conditions~~ No Action Alternative simulation, simulated long-term average annual releases from Keswick Reservoir would be reduced by approximately ~~230,000~~ 240,000 af, or 4 percent. Releases from Keswick Reservoir include releases from Shasta Reservoir and Spring Creek diversions. In comparison to the existing conditions No Action Alternative simulation, simulated long-term average annual Delta inflow would be reduced by about ~~200,000~~ 220,000 af, or 1 percent, and simulated long-term average annual delta outflow would be reduced by about 150,000 af, or ~~4~~ 1 percent.

1.1.2.6 Percent Inflow Alternative *(NO CHANGE)*
1.1.2.7 Mechanical Restoration Alternative *(NO CHANGE)*

1.1.2.8 State Permit Alternative **(CHANGES FOLLOW)**
pg. A-12

Under this alternative, diversions from the TRD to the Central Valley would increase due to reduced instream flow releases. In comparison to the No Action Alternative, the pattern of diversions from the TRD would be shifted from a spring and summer emphasis to a summer and fall emphasis to help meet Trinity River instream temperature requirements. Simulated long-term average annual diversions from the TRD in the State Permit Alternative would increase by about 200,000 af, or 23 percent. In comparison to the No Action Alternative, simulated long-term average annual releases from Keswick Reservoir would increase by approximately ~~190,000~~ 200,000 af, or 3 percent. Releases from Keswick Reservoir include releases from Shasta Reservoir and Spring Creek diversions. In comparison to the No Action Alternative, simulated long-term average annual Delta inflow would increase by about 170,000 af, or 1 percent, and simulated long-term average annual Delta outflow would increase by about ~~130,000~~ 120,000 af, or 1 percent.

1.1.2.9 Existing Conditions *(NO CHANGE)*

1.2 Surface-water Management *(SEE SUBSECTIONS)*
1.2.1 Affected Environment *(NO CHANGE)*
1.2.2 Environmental Consequences *(SEE SUBSECTIONS)*
1.2.2.2 Significance Criteria *(NO CHANGE)*
1.2.2.3 No Action *(NO CHANGE)*

1.2.2.4 Maximum Flow Alternative **(CHANGES FOLLOW)**
pg. A-19

The Maximum Flow Alternative would require operating the TRD to retain inflow into Trinity Reservoir for release to the Trinity River according to the prescribed flow release schedule. In comparison to the No Action Alternative, simulated average end-of-water year storage in Trinity Reservoir for release to the Trinity River according to the prescribed flow release schedule. In comparison to the No Action Alternative, simulated average end-of-

water year storage in Trinity Reservoir would increase during the dry period by about ~~430,000~~ 440,000 af, or 60 percent, and decrease over the long-term by about 170,000 af, or ~~23~~ 22 percent. The elimination of diversions from the TRD would potentially increase uncontrolled instream releases down the Trinity River in wetter years.

pg. A-20

Table A-8 has been modified to more accurately reflect reservoir storage and CVP deliveries comparing Maximum Flow and No Action Alternatives. See Section 2.4.1.1 for revised Table A-8.

Shasta Reservoir storage would be influenced by the absence of diversions from the TRD. There would be no diversions to contribute to the Sacramento River flows used to meet CVP deliveries, Delta water quality requirements, 1993 Winter-Run Biological Opinion temperature requirements, and other downstream obligations. In the Maximum Flow Alternative, simulate average end-of-water year Shasta Reservoir storage would be less than the No Action Alternative by approximately ~~200,000~~ 210,000 af, or ~~12~~ 8 percent. Dry period operations under this alternative would be infeasible due to decreased end-of-month storages, which could sometimes be less than the minimum operating pool of approximately ~~590,000~~ 550,000 af and could reach a simulated minimum end-of-month storage level of 5,000 af.

pg. A-21

In comparison to the No Action Alternative, simulated long-term average annual exports through Tracy Pumping Plant would be reduced by about 320,000 af, or 12 percent, due to the elimination of TRD diversions. Simulated annual exports through Banks Pumping Plant would be similar to the No Action Alternative.

In comparison to the No Action Alternative, simulated annual CVP deliveries would be reduced. The simulated long-term average annual reduction in deliveries north and south of the Delta would be about ~~480,000~~ 470,000 af. During the dry period, both the available water supply and the ability to further reduce CVP deliveries would be limited, so the average annual reduction in diversions would exceed the average annual reduction in CVP deliveries.

1.2.2.5 Flow Evaluation **(CHANGES FOLLOW)**
pg. A-22

The TRD would be operated to release additional Trinity Reservoir inflow to the Trinity River. Dam operating rules would be adjusted to account for the new instream releases. In comparison to the No Action Alternative, simulated average end-of-water year storage in Trinity Reservoir would increase during the dry period by about ~~30,000~~ 40,000 af, or ~~4~~ 5 percent, and decrease over the long-term by about ~~40,000~~ 50,000 af, or ~~3~~ 4 percent.

Shasta Reservoir storage would be influenced by the reductions in diversions from the TRD. The diversions contribute to the Sacramento River flows used to meet CVP deliveries, Delta water quality requirements, 1993 Winter-Run Biological Opinion temperature requirements, and other downstream obligations. In the Flow Evaluation Alternative, simulated average end-of-water year storage would be less than the No Action Alternative by approximately ~~50,000~~ 60,000 af, or 2 percent. During the dry period, these storage reductions could reduce

the ability of the CVP to maintain the coldwater pool for releases to meet 1993 Winter-Run Biological Opinion temperature requirements.

pg. A-23

Table A-9 has been modified to more accurately reflect reservoir storage and CVP deliveries comparing Flow Evaluation and No Action Alternatives. See Section 2.4.1.1 for revised Table A-9.

In comparison to the No Action Alternative, simulated long-term average annual exports through Tracy Pumping Plant would be reduced by about 60,000 af, or 2 percent, due to the reduction of TRD diversions. Simulated annual exports through Banks Pumping Plant would be similar to the No Action Alternative.

1.2.2.6 Percent Inflow **(CHANGES FOLLOW)**

pg. A-25

Each week, the TRD would be operated to release 40 percent of the previous week's average Trinity Reservoir inflow into the Trinity River. In drier years, instream releases would be less than the No Action Alternative, and in wetter years, they would be greater. In comparison to the No Action Alternative, simulated average end-of-water year storage in Trinity Reservoir would increase during the dry period by about ~~90,000~~ 100,000 af, or ~~12~~ 14 percent, and decrease over the long-term by about 20,000 af, or 1 percent.

Table A-10 has been modified to more accurately reflect reservoir storage and CVP deliveries comparing Percent Inflow and No Action Alternatives. See Section 2.4.1.1 for revised Table A-10.

pg. A-26

In comparison to the No Action Alternative, simulated long-term average annual exports through Tracy Pumping Plant would be reduced by about ~~20,000~~ 10,000 af, or less than 1 percent, due to the reduction of TRD diversions. Simulated annual exports through Banks Pumping Plant would be similar to the No Action Alternative.

In comparison to the No Action Alternative, simulated annual CVP deliveries would be reduced. The simulated long-term average annual reduction in deliveries north and south of the Delta would be about ~~20,000~~ 10,000 af. As in the No Action Alternative, agricultural and M&I water service contractors would be subject to delivery shortages of up to 100 percent and 50 percent of contract amounts, respectively. In both simulations, American River M&I water service contract and water rights deliveries would be reduced below minimum levels in 1977. Simulated annual deliveries to agricultural and M&I water service contractors are discussed below.

1.2.2.7 Mechanical Restoration *(NO CHANGE)*

1.2.2.8 State Permit **(CHANGES FOLLOW)**

pg. A-27

In comparison to the No Action Alternative, this alternative would increase simulated long-term average annual diversions to the Central Valley by ~~200,000~~ 210,000 af, or 23 percent, and the diversion pattern would change to help meet Trinity River instream temperature

requirements. Operations of the remaining CVP facilities would need to be rescheduled to maximize the use of this additional water. A comparison of simulated water management characteristics for the State Permit Alternative and No Action Alternative is presented in Table A-10.

The TRD would release less Trinity Reservoir inflow to the Trinity River. Dam operating rules would be adjusted to account for the lower instream releases. In comparison to the No Action Alternative, simulated average end-of-water year storage in Trinity Reservoir would increase during the dry period by about ~~30,000~~ 40,000 af, or ~~14~~ 15 percent, and over the long-term by about 80,000 af, or 6 percent.

pg. A-28

In comparison to the No Action Alternative, simulated annual exports through Tracy Pumping Plant would be increased by about ~~50,000~~ 60,000 af, or 2 percent, due to the increased TRD diversions, which would often allow additional CVP pumping. Simulated annual exports through Banks Pumping Plant would be similar to the No Action Alternative.

pg. A-29

Table A-11 has been modified to more accurately reflect reservoir storage and CVP deliveries comparing Maximum Flow and No Action Alternatives. See Section 2.4.1.1 for revised Table A-11.

1.3 Groundwater *(SEE SUBSECTIONS)*
1.3.1 Affected Environment *(SEE SUBSECTIONS)*
1.3.1.1 Data Sources *(NO CHANGE)*

1.3.1.2 Historical Perspective and Recent Conditions **(CHANGES FOLOW)**
pg. A-31

The following new text has been added to the end of Section 1.3.1.2 immediately before Section 1.3.1.3:

Trinity River Basin. Most usable groundwater in the mountainous Trinity River Basin occurs in widely scattered alluvium-filled valleys, such as those immediately adjacent to the Trinity River. These valleys contain only small quantities of recoverable groundwater, and therefore, are not considered a major source. Groundwater withdrawals in the Trinity River Basin totaled approximately 5,000 af in 1990. The Hoopa Valley is a notable groundwater resource located in the Trinity River Basin. This shallow aquifer supplies mostly domestic water and is recharged from precipitation and infiltration from local streams.

Lower Klamath River Basin/Coastal Area. Groundwater conditions in the Lower Klamath River Basin/ Coastal Area are similar to the Trinity River Basin. In general, the mountainous region is not a major source of groundwater, although some alluvial valleys do have usable resources.

Santa Clara and San Benito Counties. Imported surface water from the CVP San Felipe Unit is provided to areas in Santa Clara and San Benito Counties. Water conveyed to these areas is intended to supplement available supplies, minimize groundwater mining, stabilize groundwater level, arrest land subsidence, and improve water quality conditions.

Three interconnected groundwater basins are located within the Santa Clara County area: Santa Clara Valley Basin, Coyote Basin, and Llagas Basin (U.S. Bureau of Reclamation, 1976b). Extensive groundwater pumping for agricultural purposes produced overdraft conditions in these groundwater basins, and resulted in land subsidence, increased pumping costs, and seawater intrusion from the San Francisco Bay. To reverse these conditions, surface water was initially imported to the area in the 1960s through the SWP South Bay Aqueduct. Continued growth during the late 1960s and 1970s threatened to return the area to overdraft conditions. These concerns were dampened by additional surface-water imports to the area from the San Felipe Unit of the CVP in the 1980s. Much of this imported water is distributed to percolation ponds for groundwater recharge, and the remainder is further distributed for direct use and storage.

Groundwater resources in the San Benito County (Hollister area) consist of numerous sub-basins partially separated by barriers, generally fault zones, which criss-cross the area. Irrigation of agricultural lands in this area has relied on groundwater as the primary supply. As historical agricultural development expanded, groundwater withdrawals began to exceed groundwater recharge, causing severe declines in groundwater levels. In the 1980s, surface water was imported to this area from the San Felipe Unit of the CVP for the purposes of alleviating the degenerating groundwater conditions. Because of the complex geological fault system, direct groundwater recharge is limited; and imported water is distributed primarily for direct use and storage.

1.3.1.3 Overview of the Central Valley Regional Aquifer System *(NO CHANGE)*

1.3.1.4 Groundwater Resources of the Sacramento River Region (CHANGES FOLLOW)

Hydrogeology.
pg. A-32

Aquifer recharge of the basin has historically occurred in part from deep percoloation of rainfall, the infiltration from stream beds, and subsurface inflow along basin boundaries. Most of the recharge for the Central Valley occurs in the north and east sides of the valley where the precipitation is the greatest. With the introduction of agriculture to the region, aquifer recharge was substantially augmented by deep percolation of applied agricultural water and seepage from irrigation distribution and drainage canals.

1.3.1.5 Groundwater Resources of the San Joaquin River Region (CHANGES FOLLOW)

Hydrogeology.
pg. A-39

Recharge to the semi-confined upper aquifer ~~generally~~ occurs in part from stream seepage, deep percolation of rainfall, and subsurface inflow along basin boundaries. As agricultural practices expanded in the region, recharge was substantially augmented with deep percolation of applied agricultural water and seepage from the distribution systems used to convey this water. Recharge of the lower confined aquifer consists of subsurface inflow from the valley floor and foothill areas to the east of the eastern boundary of the Corcoran Clay Member. Present information indicates that the clay layers, including the Corcoran Clay, are not continuous in some areas, and some seepage from the semi-confined aquifer above does occur through the confining layer.

~~Historically, the interaction of groundwater and surface water resulted in net gains to the streams. This condition existed on a regional basis through about the mid 1950s. Since that time groundwater level declines have resulted in some stream reaches losing flow through seepage to the groundwater systems below.~~ Prior to the mid-1950s, the southern portion of the San Joaquin Valley in Madera County experienced net losses from streams, while the northern portion of the San Joaquin Valley generally experienced gains from streams. This situation has not changed. Currently, portions of the San Joaquin Valley continue to experience net gains from streams, while the Madera County portions of the Valley experience losses from streams. Where the hydraulic connection have been maintained, the amount of seepage has varied as groundwater levels and streamflows have fluctuated. Areas in the San Joaquin River Region where these dynamics have changed include the eastern San Joaquin and Merced counties, and western Madera County, as well as other local areas. Similar to the Sacramento River Region, the largest stream losses have occurred during the drought periods of 1976 to 1977 and 1987 to 1992.

1.3.1.6 Groundwater Resources of the Tulare Lake Region *(NO CHANGE)*
1.3.1.7 Groundwater Management and Conjunctive Use Programs *(NO CHANGE)*

1.3.2 Environmental Consequences *(SEE SUBSECTIONS)*

~~1.3.1.2~~ 1.3.2.1 Impact Assessment Methodology **(CHANGES FOLLOW)**
pg. A-54

The following new paragraph has been added as paragraph four immediately above Significance Criteria:

Groundwater resources in Santa Clara and San Benito Counties are managed through local groundwater regulations to minimize groundwater overdraft, land subsidence, and groundwater quality degradation. This groundwater management task is facilitated by CVP project water imports via the San Felipe Unit. It is assumed that these management practices will remain in place and that groundwater ordinances will limit the potential for groundwater pumping. Because of these actions, no significant impacts to groundwater resources are anticipated and, therefore, are not analyzed under environmental consequences. However, possible reductions in CVP deliveries to the San Felipe Unit could result in other impacts. These potential impacts are discussed elsewhere in the document (see Sections 3.9 Land Use, 3.11 Socioeconomics, and 4.1 Cumulative Impacts).

1.3.2.2 Groundwater Storage and Production *(NO CHANGE)*
1.3.2.3 Groundwater Levels *(NO CHANGE)*
1.3.2.4 Land Subsidence *(NO CHANGE)*
1.3.2.5 Groundwater Quality *(NO CHANGE)*
1.3.2.6 No-action Alternative *(NO CHANGE)*
1.3.2.7 Sacramento River Region *(NO CHANGE)*
1.3.2.8 San Joaquin River Region *(NO CHANGE)*
1.3.2.9 Tulare Lake Region *(NO CHANGE)*
1.3.2.10 Maximum Flow Alternative *(NO CHANGE)*
1.3.2.11 Sacramento River Region *(NO CHANGE)*
1.3.2.12 San Joaquin River Region *(NO CHANGE)*
1.3.2.13 Tulare Lake Region *(NO CHANGE)*
1.3.2.14 Flow Evaluation Alternative/Preferred Alternative *(NO CHANGE)*

1.3.2.15 Percent Inflow Alternative *(NO CHANGE)*
1.3.2.16 Mechanical Restoration Alternative *(NO CHANGE)*
1.3.2.17 State Permit Alternative *(NO CHANGE)*

The following five new sections have been added to the end of Groundwater:

pg. A-72

1.3.2.18 Existing Conditions versus Preferred Alternative

The comparison of the Preferred Alternative (i.e., Flow Evaluation) to 1995 existing conditions to without-project conditions in 2020 (i.e., No-Action Alternative) indicates that most impacts to groundwater elevations between 1995 and 2020 would be attributed to changes unrelated to the project. For example, the largest declines in groundwater elevations are seen in the urban areas of Sacramento and Fresno, the result of population growth. Impacts as a result of the Preferred Alternative are not as great.

1.3.2.19 Sacramento River Region

Groundwater elevations under the Preferred Alternative would be lower compared to existing conditions primarily on the east side of the region where long-term elevations would decline by as much as 65 feet in the Sacramento area. However, these impacts are caused by the increase in development (e.g., population growth) from 1995-2020. Groundwater-elevation declines of 5 feet on the west side of the region can be attributed to the Preferred Alternative, and would result in a significant impact. These declines occur in areas receiving agricultural service contract water from the CVP, such as the Tehama-Colusa Canal service area. No additional impacts with regard to subsidence or decreased water quality would be expected in comparison to existing conditions.

1.3.2.20 San Joaquin River Region

Groundwater elevations under the Preferred Alternative would be higher compared to existing conditions on the northeast side of the region where long-term groundwater elevations would increase by as much as 20 feet. These impacts are caused by the assumed level of development from 1995-2020. No significant impacts to groundwater elevations, subsidence, or water quality can be attributed to the Preferred Alternative.

1.3.2.21 Tulare Lake Region

Groundwater elevations in the south and east side of the region would be 15 and 25 feet lower, respectively, under the Preferred Alternative compared to existing conditions. Groundwater elevations would increase 5-15 feet along the west side and mid-valley areas. All of these changes are caused by the assumed level of development from 1995-2020, i.e., they are not related to the project. Impacts attributable to the Preferred Alternative would occur along the extreme west side area, where the maximum decline in groundwater elevations would be approximately 20 feet. Additional land subsidence would occur along the west side of the Tulare Lake Region. The range of changes is from 1 and 10 feet, primarily in areas receiving CVP agricultural service contract water via the San Luis Canal. The range impacts decreases 1-5 feet towards the axis of the Central Valley. The area of land subsidence surrounds major conveyance facilities, including the California Aqueduct. Additional groundwater pumping, causing the upwards migration of lesser quality ground-

water along the west side of the region, could possibly result in upwelling of groundwater high in TDS into productive groundwater zones; resulting in significant impacts to groundwater quality.

1.3.2.22 Mitigation

Potentially significant groundwater-related impacts could occur with the implementation of the Maximum Flow, Flow Evaluation, and Percent Inflow Alternatives as a result of decreased surface-water supplies. Although changes to water supply per se were not considered an impact, the development of additional water supplies to meet demands would lessen the associated impacts (e.g., groundwater impacts). A number of demand- and supply-related programs are currently being studied across California, many of which are being addressed through the on-going CALFED and CVPIA programs and planning processes. Although none of these actions would be directly implemented as part of the alternatives discussed in the DEIR/EIS, each could assist in offsetting impacts resulting from decreased Trinity River exports. Examples of actions being assessed in the CALFED and CVPIA planning processes include:

- Develop and implement additional groundwater and/or surface-water storage. Such programs could include the construction of new surface reservoirs and groundwater storage facilities, as well as expansion of existing facilities. Potential locations include sites throughout the Sacramento and San Joaquin Valley watersheds, the Trinity River Basin, and the Delta.
- Purchase long- and/or short-term water supplies from willing sellers (both in-basin and out-of-basin) through actions including, but not limited to, temporary or permanent land fallowing.
- Facilitate willing buyer/willing seller inter- and intra-basin water transfers that derive water supplies from activities such as conservation, crop modification, land fallowing, land retirement, groundwater substitution, and reservoir re-operation.
- Promote and/or provide incentive for additional water conservation to reduce demand.
- Decrease demand through purchasing and/or promoting the temporary fallowing of agricultural lands.
- Increase water supplies by promoting additional water recycling.

1.4 Water Quality *(SEE SUBSECTIONS)*
1.4.1 Temperature *(NO CHANGE)*
1.4.2 Turbidity *(NO CHANGE)*
1.4.3 Sediment *(NO CHANGE)*
1.4.4 Affected Environment *(SEE SUBSECTIONS)*
1.4.4.1 Trinity River Basin *(NO CHANGE)*
1.4.4.2 Lower Klamath River Basin/Coastal Area *(NO CHANGE)*

1.4.4.3 Central Valley **(CHANGES FOLLOW)**
pg. A-78

Water Quality Concerns. Water in the Sacramento-San Joaquin Delta generally meets public water supply water quality standards identified by the EPA and the California

Department of Health Services. However, stricter federal standards have been promulgated and are significantly more difficult and costly to meet. The standards of concern relate to DBPs and the potential requirements for more rigorous disinfection. In addition, the standard for arsenic, which is found naturally in Delta waters, is under evaluation and will be lowered. A new MCL will be proposed in ~~January~~ spring 2000.

pg. A-79

The presence of bromide in a drinking water source complicates the disinfection process. As with chlorine, bromide forms THMs in the chlorination process and these brominated THMs are also potentially harmful to human health. Bromide is about twice as heavy as chlorine, and the THM standard is based on weight. Hence, it takes fewer molecules of brominated THMs to exceed the drinking water standard. Current EPA statements suggest that bromine compounds may be more harmful than chlorine compounds. Another method of disinfection, ozone treatment, is also complicated by the presence of bromide because it forms bromate, a compound known to be carcinogenic in laboratory animals and thought to be a potential human carcinogenic.

Health Effects of Contaminants in Water.

Parasites.

Giardia lamblia.

pg. A-83

Ingestion of as few as 10 cysts ~~can~~ may cause infection (Rendtorff and Holt, 1954). Infection was measured by the excretion of cysts, and illness was not determined. The ratio of illness to infection is highly variable. *Giardia lamblia* infections with no symptoms of illness may be as high as 39 percent for children under five years old and 76 percent for adults in certain populations (Craft, 1981; and Wolf, 1979; as reported in Rose, et al., 1991). At the same time, symptomatic infections have been reported at a rate of 50 to 67 percent and as high as 91 percent in others (Veazie, et al., 1979, as reported in Rose, et al., 1991). In yet other groups, chronic giardiasis may develop in as many as 58 percent of an infected population.

pg. A-84

Table A-26 has been modified to correct a typographical error it the title. See Section 2.4.1.1 for revised Table A-26.

Results of the State Project/Delta Water Pathogen Monitoring Project.

A total of 48 samples was collected and analyzed for *Giardia lamblia* cysts, *Cryptosporidium* oocysts, enteric viruses and coliform bacteria. The percent positive and mean concentrations (cysts(o~~nd~~ocysts)/ 100 ~~l~~ L) at each of the four stations for protozoans are shown in Table II-4.

Water Quality Rules and Regulations.
pg. A-89

Trihalomethane Regulation. In 1979, the EPA published an amendment to the NPDWR, which established an MCL for THMs. The THM regulation applies to all public water systems serving populations greater than 10,000. Large sized utilities were required to begin monitoring for total trihalomethanes (TTHMs) in November 1980. The regulation established an MCL of 100 Fg/l for TTHMs in the distribution system. TTHMs include the summation of chloroform, bromodichloromethane, dibromochloromethane, and bromoform concentrations. Because THMs form after the application of the disinfectant, compliance with the MCL is based on a running annual average of at least four sampling points for each treatment plant with 25 percent of the samples taken at locations within the distribution system representing the maximum residence time of water in the system, and with at least 75 percent of the samples being collected from representative sites in the distribution system (considering number of persons served, sources of water, and treatment methods). The current TTHM MCL is 80 ppb and may be reduced in the future.

Disinfectants/Disinfection By-Products Regulation.
pg. A-91

On December 16, 1998 the USEPA promulgated the "Disinfectant/Disinfection By-Products Rule" which lowers the MCL for Trihalomethanes from 100 ppb to 80 ppb and adds regulations from other disinfection by-products. The reduction of the TTHM, HAA, and bromate MCLs from their current levels of 80 ppb, 40 ppb, and 10 ppb is the subject of discussion in the FACA negotiations. Information on probable levels of regulation for these and other disinfection byproducts are not available at this time. It also established source water Total Organic Carbon values that will require treatment at different levels depending upon the alkalinity and the background TOC. It can be anticipated that some of the water suppliers taking water out of the Delta will be required to provide more treatment. In that the three alternatives do not show a variance in TOC, as expressed by DOC, this treatment change is not as a results of the proposed project.

1.4.5 Environmental Consequences *(SEE SUBSECTIONS)*
1.4.5.1 Methodology *(NO CHANGE)*

1.4.5.2 Significance Criteria **(CHANGES FOLLOW)**
pg. A-93

The following significance criteria were identified for Water Quality:

- Substantial degradation of water quality, such that existing beneficial uses are precluded specifically due to adverse water quality.
- Violate any water quality standards or waste discharge requirements.
- Substantial alterations of the course of a stream or river in a manner that would result in substantial erosion or siltation on- or off-site.
- Short- or long-term increases in turbidity of 20 percent or more over naturally occurring background levels.

- Contamination of a public water supply.
- Variation in instream temperatures so as to adversely impact state or federally listed aquatic species (see the Fishery Resources section [3.5]). This is defined as an increase in the number of months with modeled temperatures exceeding the 1993 Winter-run Biological Opinion by more than ~~0.5°F, or a change in carryover storage at Shasta Reservoir compared to No Action. Notably, the use of a 0.5°F change in temperature as a significant impact represents a very conservative approach, in that the~~ any modeled temperature greater than the 56°F threshold criterion (or 60°F depending on date), or a change in carryover storage at Shasta Reservoir compared to No Action. Notably, the use of no change in temperature greater than the threshold criterion of 56°F (or 60°F) as a significant impact represents a very conservative approach, in that the Central Valley Regional Water Quality Control Board normally considers a temperature change to be significant if a 1.0 degree change occurs.
- Degradation of water quality for a water quality constituent in a waterbody listed as impaired (e.g., under California's Clean Water Act 303(d) list).

1.4.5.3 No Action *(NO CHANGE)*

1.4.5.4 Maximum Flow **(CHANGES FOLLOW)**
pg. A-95

Central Valley. The elimination of TRD exports would significantly reduce the ability to meet temperature criteria in the Sacramento River. This is evidenced by an increase of ~~3~~ 7 percentage points in the frequency that Sacramento River temperatures would exceed the Biological Opinion temperature objectives, compared to the No Action Alternative (Table A-31). Shasta Reservoir carryover storage violations would increase 2 percentage points compared to No Action due to increased reliance on the reservoir to meet river temperature requirements in spring and early summer (Table A-31). The decreased ability to meet the Biological Opinion criteria would be a significant impact.

1.4.5.5 Flow Evaluation **(CHANGES FOLLOW)**
pg. A-97

Central Valley. Sacramento River modeled temperature violations occurred at a slightly higher frequency than under the No Action Alternative (20.5 percent versus ~~19.7~~ 15.9) (Table A-32). Violations occurred in both wet and dry conditions due to the variable nature of the standards. This impact would be significant. Modeled frequency of Shasta Reservoir carryover violations was the same as under No Action (Table A-32).

1.4.5.6 Percent Inflow **(CHANGES FOLLOW)**
pg. A-98

Central Valley. Sacramento River modeled temperature violations would occur slightly more frequently than No Action levels (20.1 percent versus ~~19.7~~ 15.9), resulting in a significant impact (Table A-33). The months with violations occur across wet and dry conditions due to the variable nature of the standards. The modeled frequency of Shasta carryover violations was the same as under No Action (Table A-33).

1.4.5.7 Mechanical Restoration *(NO CHANGE)*

1.4.5.8 State Permit **(CHANGES FOLLOW)**
pg. A-100

Central Valley. This alternative would result in a slight increase in temperature violations compared to the No Action Alternative (16.4 percent versus 15.9). Conditions would improve with regard to meeting ~~both Sacramento River temperature and~~ Shasta Reservoir carryover storage objectives as a result of the increased TRD exports compared to No Action levels (Table A-35). These months with temperature violations occurred across both wet and dry conditions due to the variable nature of the standards.

1.4.5.9 Existing Conditions versus Preferred Alternative **(CHANGES FOLLOW)**
pg. A-101

Central Valley. Modeled Sacramento River temperature violations would occur more frequently under the Preferred Alternative than under 1995 existing conditions (20 percent of the months compared to 14 percent). ~~However, most (87 percent) of the non-compliance is attributed to the increase in water demand assumed for the 2020 level of development.~~ Preferred Alternative carryover storage violations also increased compared to 1995 existing conditions, but all of the increase was attributed to non-project changes (e.g., population growth and higher contract demand). (In other words, the Preferred Alternative and No Action impacts are identical.)

1.5 References *(NO CHANGE)*

2.4.1.1 Technical Appendix A—Tables and Figures

Tables

Figures

A-8	Historical Cumulative Change in Groundwater Storage for the Sacramento River Region (1970-1992)	*(NO CHANGE)*
A-9	Historical Groundwater Pumping and Irrigated Agricultural Acreage for the Sacramento River Region	*(NO CHANGE)*
A-10	Groundwater Elevations in the Sacramento Valley, Spring 1993	*(NO CHANGE)*
A-11	Aerial Extent of Land Subsidence in the Central Valley Due to Declines in Groundwater Elevations	*(NO CHANGE)*
A-12	Estimated Changes in Hydraulic Head in Lower Pumped Zone from 1860 to 1961	*(NO CHANGE)*
A-13	Aerial Extent of Land Subsidence in the Central Valley Due to Groundwater Level Decline	*(NO CHANGE)*
A-14	TDS Concentrations in the Groundwater Aquifer of the Central Valley	*(NO CHANGE)*
A-15	Potential Nitrate and Boron Problem Areas in the Sacramento Valley	*(NO CHANGE)*
A-16	Generalized Geohydrological Cross-sections in the San Joaquin River and Tulare Lake Regions	*(NO CHANGE)*
A-17	Approximate Boundary of the Corcoran Clay Member	*(NO CHANGE)*
A-18	Historical Cumulative Change in Groundwater Storage for the San Joaquin River and Tulare Lake Regions (1970-1992)	*(NO CHANGE)*
A-19	Historical Groundwater Pumping and Irrigated Agricultural Acreage for the San Joaquin River Region	*(NO CHANGE)*
A-20	Groundwater Elevations in the San Joaquin Valley, Spring 1993	*(NO CHANGE)*
A-21	Areas of Elevated DBCP Levels in Groundwater of the San Joaquin Valley	*(NO CHANGE)*
A-22	Historical Groundwater Pumping and Irrigated Agricultural Acreage for the Tulare Lake Region	*(NO CHANGE)*
A-23	Groundwater Elevations, No Action Alternative	*(NO CHANGE)*
A-24	Differences in Groundwater Elevations for Maximum Flow Alternative as Compared to No Action Alternative	*(NO CHANGE)*
A-25	Increase in Simulated Land Subsidence in Maximum Flow Alternative from No Action Alternative	*(NO CHANGE)*
A-26	Differences in Groundwater Elevations for Flow Evaluation Alternative as Compared to No Action Alternative	*(NO CHANGE)*
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A-28	Differences in Groundwater Elevations for Percent Inflow Alternative as Compared to No Action Alternative	*(NO CHANGE)*
A-29	Increase in Simulated Land Subsidence in Percent Inflow Alternative from No Action Alternative	*(NO CHANGE)*
A-30	Differences in Groundwater Elevations for State Permit Alternative as Compared to No Action Alternative	*(NO CHANGE)*
DSM 2-2	Greens Landing Average Monthly Water Quality	*(NO CHANGE)*
DSM 2-3	Sacramento River at Greens Landing Average Monthly Water Quality Average of Critical Dry Years Between 1976-1990	*(NO CHANGE)*
DSM 2-4	North Bay Aqueduct Average Monthly Water Quality	*(NO CHANGE)*
DSM 2-5	North Bay Aqueduct Average Monthly Water Quality Average of Critical Dry Years Between 1976-1990	*(NO CHANGE)*
SEM 2-6	Contra Costa Canal Intake Average Monthly Water Quality	*(NO CHANGE)*
DSM 2-7	Contra Costa Canal Intake Average Monthly Water Quality Average of Critical Dry Years Between 1976-1990	*(NO CHANGE)*
DSM 2-8	Old River at Highway 4 Average Monthly Water Quality	*(NO CHANGE)*
DSM 2-9	Old River at Highway 4 Average Monthly Water Quality Average of Critical Dry Years Between 1976-1990	*(NO CHANGE)*
DSM 2-10	Delta Mendota Canal Intake Average Monthly Water Quality	*(NO CHANGE)*
DSM 2-11	Delta Mendota Canal Intake Average Monthly Water Quality Average of Critical Dry Years Between 1976-1990	*(NO CHANGE)*
DSM 2-12	Clifton Court Forebay Average Monthly Water Quality	*(NO CHANGE)*
DSM 2-13	Clifton Court Forebay Average Monthly Water Quality Average of Critical Dry Years Between 1976-1990	*(NO CHANGE)*

Table A-1A Comparison of Impacts on Water Resources									
	Alternatives Compared to No Action								
Parameter	Hydrologic Conditions[a]	No Action	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions	Preferred Alternative to Existing Conditions
Trinity Reservoir elevation (ft)	Dry	2,255	34	11	19	0	22	2,267	-1
May 30	Wet	2,352	-43	-3	-8	0	6	2,357	-8
	Average	2,319	-33	4	2	0	16	2,325	-2
September 30	Dry	2,207	64	18	25	0	11	2,217	8
	Wet	2,318	-18	-2	-2	0	4	2,320	-4
	Average	2,282	-9	2	4	0	11	2,287	-3
Shasta Reservoir elevation (ft)	Dry	995	-22	-7	-3	0	0	998	-10
May 30	Wet	1,062	-3	-3	-1	0	1	1,062	-3
	Average	1,045	-5	-3	-1	0	1	1,046	-4
September 30	Dry	933	-65	-11	-1	0	3	939	-17
	Wet	1,020	-15	-6	-2	0	2	1,020	-6
	Average	992	-15	-3	0	0	4	995	-6
San Luis Res. elevation (ft)	Dry	467	4	1	1	0	-3	463	5
May 30	Wet	511	-2	1	0	0	1	520	-8
	Average	487	4	1	0	0	0	491	-3
September 30	Dry	381	-3	-2	0	0	-5	373	6
	Wet	430	-10	1	-1	0	1	445	-14
	Average	396	-2	-2	0	0	0	401	-7
Trinity River Exports (af/ yr)	Dry	540,000	-100%	-30%	-2%	0%	39%	530,000	-28%
	Wet	1,110,000	-100%	-33%	-26%	0%	17%	1,100,000	-33%
	Average	870,000	-100%	-28%	-16%	0%	23%	870,000	-28%
Trinity Reservoir storage (af)	Dry	730,000	60%	5%	14%	0%	5%	750,000	3%
September 30	Wet	1,720,000	-15%	-2%	-2%	0%	2%	1,730,000	-2%
	Average	1,390,000	-12%	-4%	-1%	0%	6%	1,400,000	-4%

Table A-1A Comparison of Impacts on Water Resources									
	Alternatives Compared to No Action								
Parameter	Hydrologic Conditions[a]	No Action	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions	Preferred Alternative to Existing Conditions
Shasta Reservoir storage (af)	Dry	1,690,000	-30%	-8%	-1%	0%	2%	1,780,000	-12%
September 30	Wet	3,290,000	-10%	-4%	-1%	0%	1%	3,280,000	-4%
	Average	2,770,000	-8%	-2%	0%	0%	2%	2,810,000	-4%
San Luis Reservoir storage (af)	Dry[b]	390,000	-5%	-3%	0%	0%	-10%	340,000	12%
September 30	Wet	850,000	-13%	0%	-1%	0%	1%	990,000	-14%
	Average	540,000	-6%	-4%	-2%	0%	-2%	590,000	-12%
CVP deliveries north of Delta[b] (af/ yr)	Dry[b]	2,680,000	-6%	-4%	0%	0%	2%	2,390,000	8%
	Wet	3,240,000	-1%	0%	0%	0%	0%	2,880,000	13%
	Average	3,120,000	-4%	-1%	0%	0%	1%	2,780,000	11%
CVP deliveries south of Delta[b] (af/ yr)	Dry[b]	1,580,000	-13%	-3%	1%	0%	13%	1,630,000	-6%
	Wet	2,960,000	-3%	-1%	0%	0%	0%	2,980,000	-1%
	Average	2,570,000	-13%	-2%	0%	0%	2%	2,600,000	-3%
Exports, Tracy Pumping Plant (af/ yr)	Dry	1,810,000	-13%	-5%	0%	0%	10%	1,830,000	-6%
	Wet	2,850,000	-1%	0%	0%	0%	0%	2,870,000	-1%
	Average	2,640,000	-12%	-2%	0%	0%	2%	2,670,000	-3%
Exports, Banks Pumping Plant (af/ yr)	Dry	1,860,000	-2%	2%	0%	0%	3%	1,880,000	1%
	Wet	4,060,000	-1%	-1%	0%	0%	-1%	3,160,000	27%
	Average	3,310,000	-1%	0%	0%	0%	0%	2,890,000	14%
Exports, Tracy and Banks Pumping Plants (af/ yr)	Dry	3,670,000	-5%	-2%	0%	0%	6%	3,710,000	-3%
	Wet	6,910,000	-1%	-1%	0%	0%	0%	6,030,000	14%
	Average	5,950,000	-6%	-1%	0%	0%	1%	5,560,000	6%

Table A-1A Comparison of Impacts on Water Resources									
	Alternatives Compared to No Action								
Parameter	**Hydrologic Conditions[a]**	**No Action**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**	**Existing Conditions**	**Preferred Alternative to Existing Conditions**
Delta Inflow (af/ yr)	Dry	11,830,000	-2%	-1%	0%	0%	2%	11,850,000	~~0%~~ 1%
	Wet	29,730,000	-4%	-1%	-1%	0%	1%	29,690,000	-1%
	Average	22,570,000	-4%	-1%	-1%	0%	1%	22,550,000	-1%
Delta Outflow (af/ yr)	Dry	6,320,000	-1%	0%	0%	0%	-1%	6,320,000	0%
	Wet	20,890,000	-5%	-1%	-1%	0%	1%	21,770,000	-5%
	Average	14,710,000	-3%	-1%	-1%	0%	1%	15,120,000	-4%
Trinity River releases (af/ yr)	Critically dry	340,000b	36%	8.5%	-51%	0%	-65%	340,000	8.5%
	Dry	340,000b	160%	33%	-4.7%	0%	-65%	340,000	33%
	Normal	340,000b	250%	87%	30%	0%	-65%	340,000	87%
	Wet	340,000b	340%	110%	93%	0%	-65%	340,000	110%
	Extremely wet	340,000b	530%	140%	190%	0%	-65%	340,000	140%

[a] "Dry" is based on hydrology in the dry period (1928-34); "wet" is based on a wet period (1967-71); and "average" is based on the long-term average (1922-90).

[b]Plus additional releases as required by U.S. Bureau of Reclamation Safety of Dams criteria, if needed.

Table A-3 Comparison of No Action and Flow Evaluation Alternatives			
Water-year Class	**No Action Alternative**	**Flow Evaluation Alternative**	**Percent Change**
Critically dry	340,000 af	369,000 af	9
Dry	340,000 af	453,000 af	25
Normal	340,000 af	~~636,000 af~~ 647,000	87
Wet	340,000 af	701,000 af	106
Extremely wet	340,000 af	815,000 af	140
Peak flow	2,000 cfs in May	11,000 cfs/ 5 days in May (extremely wet year)	450

Table A-8 Comparison of Water Management Characteristics between Maximum Flow and No Action Alternatives				
Parameter	**Water-year Condition**	**No Action**	**Maximum Flow**	**Percent Change**
Trinity Reservoir storage (af) on September 30 [a]	Dry [b]	~~733,000~~ 730,000	~~1,167,000~~ 1,170,000	~~59~~ 60
	Wet [c]	~~1,609,000~~ 1,720,000	~~1,266,000~~ 1,470,000	~~-21~~ -15
	Average [d]	~~1,374,000~~ 1,390,000	~~1,374,000~~ 1,220,000	-12
Shasta Reservoir storage (af) on September 30 [a]	Dry [b]	~~1,688,000~~ 1,690,000	~~1,177,000~~ 1,180,000	-30
	Wet [c]	~~3,036,000~~ 3,290,000	~~2,790,000~~ 2,970,000	~~-8~~ -10
	Average [d]	~~2,746,000~~ 2,770,000	~~2,541,000~~ 2,560,000	~~-7~~ -8
CVP deliveries north of Delta[e] (af/ yr)	Dry [b]	2,680,000	~~2,604,000~~ 2,520,000	-6
	Wet [c]	3,240,000	~~3,298,000~~ 3,210,000	-1
	Average [d]	3,120,000	~~3,078,000~~ 2,990,000	-4
CVP deliveries south of Delta[e] (af/ yr)	Dry [b]	1,580,000	~~1,618,000~~ 1,380,000	-13
	Wet [c]	2,960,000	~~3,142,000~~ 2,880,000	-3
	Average [d]	2,570,000	~~2,480,000~~ 2,230,000	-14 –13

[a] September 30 is the end of the October 1-September 30 water year. This estimates carryover storage.
[b] Average annual values for a dry period (1928-34), assuming 2020 development and water demand.
[c] Average annual values for a wet period (1967-71), assuming 2020 development and water demand.
[d] Average annual values for the 69-year period of simulation (1922-90), assuming 2020 development and water demand.
[e] Annual values calculated on a contract year basis (March through February).

Table A-9
Comparison of Water Management Characteristics between Flow Evaluation and No Action Alternatives

Parameter	Water-year Condition	No Action	Flow Evaluation	Percent Change
Trinity Reservoir storage (af) on September 30 [a]	Dry [b]	~~733,000~~ 730,000	~~767,000~~ 770,000	5
	Wet [c]	~~1,609,000~~ 1,720,000	~~1,576,000~~ 1,690,000	-2
	Average [d]	~~1,374,000~~ 1,390,000	~~1,332,000~~ 1,340,000	~~-3~~ –4
Shasta Reservoir storage (af) on September 30 [a]	Dry [b]	~~1,688,000~~ 1,690,000	~~1,559,000~~ 1,560,000	-8
	Wet [c]	~~3,036,000~~ 3,290,000	~~2,968,000~~ 3,160,000	~~-2~~ –4
	Average [d]	~~2,746,000~~ 2,770,000	~~2,696,000~~ 2,710,000	~~-2~~ –2
CVP deliveries north of Delta[e] (af/ yr)	Dry [b]	~~2,760,000~~ 2,680,000	~~2,654,000~~ 2,570,000	-4
	Wet [c]	~~3,328,000~~ 3,240,000	~~3,328,000~~ 3,240,000	0
	Average [d]	~~3,209,000~~ 3,120,000	~~3,180,000~~ 3,090,000	-1
CVP deliveries south of Delta[e] (af/ yr)	Dry [b]	~~1,820,000~~ 1,580,000	~~1,764,000~~ 1,530,000	~~-4~~ –3
	Wet [c]	~~3,222,000~~ 2,960,000	~~3,203,000~~ 2,940,000	-1
	Average [d]	~~2,828,000~~ 2,570,000	~~2,763,000~~ 2,510,000	-2

[a] September 30 is the end of the October 1-September 30 water year. This estimates carryover storage.

[b] Average annual values for a dry period (1928-34), assuming 2020 development and water demand.

[c] Average annual values for a wet period (1967-71), assuming 2020 development and water demand.

[d] Average annual values for the 69-year period of simulation (1922-90), assuming 2020 development and water demand.

[e] Annual values calculated on a contract year basis (March through February).

Table A-10
Comparison of Water Management Characteristics between Percent Inflow and No Action Alternatives

Parameter	Water-year Condition	No Action	Percent Inflow	Percent Change
Trinity Reservoir storage (af) on September 30 [a]	Dry [b]	~~733,000~~ 730,000	~~826,000~~ 830,000	~~13~~ 14
	Wet [c]	~~1,609,000~~ 1,720,000	~~1,579,000~~ 1,690,000	-2
	Average [d]	~~1,374,000~~ 1,390,000	~~1,357,000~~ 1,370,000	-1
Shasta Reservoir storage (af) on September 30 [a]	Dry [b]	~~1,688,000~~ 1,690,000	~~1,666,000~~ 1,670,000	-1
	Wet [c]	~~3,036,000~~ 3,290,000	~~3,008,000~~ 3,250,000	-1
	Average [d]	~~2,746,000~~ 2,770,000	~~2,738,000~~ 2,760,000	0
CVP deliveries north of Delta[e] (af/ yr)	Dry [b]	~~2,760,000~~ 2,680,000	~~2,771,000~~ 2,690,000	~~0~~ 1
	Wet [c]	~~3,328,000~~ 3,240,000	~~3,328,000~~ 3,240,000	0
	Average [d]	~~3,209,000~~ 3,120,000	~~3,206,000~~ 3,120,000	0
CVP deliveries south of Delta[e] (af/ yr)	Dry [b]	~~1,820,000~~ 1,580,000	~~1,838,000~~ 1,600,000	1
	Wet [c]	~~3,222,000~~ 2,960,000	~~3,222,000~~ 2,960,000	0
	Average [d]	~~2,828,000~~ 2,570,000	~~2,809,000~~ 2,560,000	~~-1~~ 0

[a] September 30 is the end of the October 1-September 30 water year. This estimates carryover storage.
[b] Average annual values for a dry period (1928-34), assuming 2020 development and water demand.
[c] Average annual values for a wet period (1967-71), assuming 2020 development and water demand.
[d] Average annual values for the 69-year period of simulation (1922-90), assuming 2020 development and water demand.
[e] Annual values calculated on a contract year basis (March through February).

Table A-11
Comparison of Water Management Characteristics between State Permit and No Action Alternatives

Parameter	Water-year Condition	No Action	State Permit	Percent Change
Trinity Reservoir storage (af) on September 30 [a]	Dry [b]	~~733,000~~ 730,000	~~765,000~~ 770, 000	~~4~~ 5
	Wet [c]	~~1,609,000~~ 1,720,000	~~1,665,000~~ 1,760,000	~~3~~ 2
	Average [d]	~~1,374,000~~ 1,390,000	~~1,458,000~~ 1,470,000	6
Shasta Reservoir storage (af) on September 30 [a]	Dry [b]	~~1,688,000~~ 1,690,000	~~1,728,000~~ 1,730,000	2
	Wet [c]	~~3,036,000~~ 3,290,000	~~3,039,800~~ 3,320,000	2
	Average [d]	~~2,746,000~~ 2,770,000	~~2,810,000~~ 2,830,000	~~2~~ 1
CVP deliveries north of Delta[e] (af/ yr)	Dry [b]	~~2,760,000~~ 2,680,000	~~2,820,000~~ 2,740,000	2
	Wet [c]	~~3,328,000~~ 3,240,000	~~3,328,000~~ 3,240,000	0
	Average [d]	~~3,209,000~~ 3,120,000	~~3,231,000~~ 3,140,000	1
CVP deliveries south of Delta[e] (af/ yr)	Dry [b]	~~1,820,000~~ 1,580,000	~~2,028,000~~ 1,790,000	13
	Wet [c]	~~3,222,000~~ 2,960,000	~~3,222,000~~ 2,960,000	0
	Average [d]	~~2,828,000~~ 2,570,000	~~2,884,000~~ 2,630,000	2

[a] September 30 is the end of the October 1-September 30 water year. This estimates carryover storage.
[b] Average annual values for a dry period (1928-34), assuming 2020 development and water demand.
[c] Average annual values for a wet period (1967-71), assuming 2020 development and water demand.
[d] Average annual values for the 69-year period of simulation (1922-90), assuming 2020 development and water demand.
[e] Annual values calculated on a contract year basis (March through February).

Table A-26
Oocysts in Typical U.sS. Waters

Water Source	Percent of Samples Positive for Oocysts	Average Oocysts per Liter (1)
Sewage, raw	91	4 – 5180
Sewage, treated	91	4 – 1297
Streams/ Rivers	77	0.94, 1.09, 1.3
Lakes/ Reservoirs	75	0.58, 0.91
Pristine Rivers	83	0.02, 0.08
Treated Drinking Water	28	0.002, 0.009

NOTES:
(1) Geometric means of samples.
SOURCE:
Rose, 1988.

2.4.1.2 Technical Appendix A—Attachments

Technical Memorandum: CVPIA—PEIS Revised No Action Alternative and Trinity EIS/EIR Alternatives Comparisons **(CHANGES FOLLOW)**

Technical Memorandum: Existing Conditions and Flow Evaluation Study Alternative **(CHANGES FOLLOW)**

Further Analysis of Potential Spills for Operations Under Varying Dam Raises and Minimum Pools *(NO CHANGE)*

Summary of Spills at Trinity Dam: Trinity Dam Restoration EIS/EIR Flow Alternatives *(NO CHANGE)*

Reclamation Temperature Model: Sacramento River *(NO CHANGE)*

Reclamation Temperature Model: Trinity Dam *(NO CHANGE)*

Temperature Analysis of Proposed Trinity River Fish and Wildlife Restoration Flow Alternatives Using the BETTER model *(NO CHANGE)*

Addendum to Temperature Analysis of Proposed Trinity River Fish and Wildlife Restoration Flow Alternatives Using the BETTER Model—Cumulative Effects Analyses *(NO CHANGE)*

Trinity Dam Auxillary Outlet Releases *(NO CHANGE)*

Assessment of the Hoopa Valley Tribe Water Temperature Objectives in Relation to Alternatives of the Trinity River EIS/EIR

CVRWQCB 1998 Clean Water Act Section 303(d) List **(CHANGES FOLLOW)**

Technical Memorandum: CVPIA—PEIS Revised No Action Alternative and Trinity EIS/EIR Alternatives Comparisons

MODELING BACKGROUND *(NO CHANGE)*

ALTERNATIVE ASSUMPTIONS *(NO CHANGE)*

INSTREAM FLOWS AND DIVERSIONS FROM THE TRINITY RIVER BASIN *(NO CHANGE)*

STORAGE **(CHANGES FOLLOW)**

Shasta Reservoir
pg. 4

For each of the alternatives, frequency distributions of simulated end-of-water year storages in Shasta Reservoir are presented in Figure TM3a-5. These storages are influenced by the increases and decreases in diversions from the Trinity River Basin in the alternatives as compared to the No-Action Alternative. The diversions contribute to the Sacramento River flows that are used to meet CVP deliveries, Delta water quality requirements, Winter-Run Biological Opinion temperature requirements, and other downstream obligations. In the State Permit Alternative, end-of-water year storages are greater than the No-Action Alternative because increases in Trinity River Basin diversions often decrease the need for Shasta Reservoir releases. In the Flow Evaluation Study and Percent Inflow alternatives, end-of-water year storages are often less than the No-Action Alternative. In these alternatives, Trinity River Basin diversions are less than in the No-Action Alternative so additional releases from Shasta Reservoir are often required. Unless the reservoir refills, these additional releases may reduce storage in Shasta Reservoir in following years as compared to the No-Action Alternative. These storage reductions may reduce the ability of the CVP to maintain the cold water pool for releases to meet Winter-Run Biological Opinion temperature requirements. In the Maximum Flow Alternative, dry period operations are infeasible due to decreased end-of-month storages which are sometimes less than the minimum operating pool of approximately ~~590~~ 550 taf and reach a minimum end-of-month storage level of 5 taf.

DELTA FLOWS AND EXPORTS **(CHANGES FOLLOW)**

Delta Inflow and Outflow
pg. 5

For each of the alternatives, frequency distributions of simulated annual Delta inflow and outflow volumes are presented in Figures TM3a-6 and 8. The average annual Delta inflow and outflow volumes for the dry, wet, and overall simulation periods are presented in Figures TM3a-7 and 9. Due to the magnitude of scale, it is difficult to see the differences amongst the alternatives. For each of the alternatives, average annual inflows and outflows are presented in Table TM3a-1. During the overall simulation period, average annual inflows vary as much as ~~3~~ 4 percent from the No-Action Alternative. This is a reduction of approximately 0.8 maf in the Maximum Flow Alternative as compared to an average annual Delta inflow of ~~22.7~~ 22.6 maf in the No-Action Alternative. The same variance is seen in

Delta outflows. During the overall simulation period, average annual outflows vary as much as 3 percent from the No-Action Alternative. This is a reduction of approximately 0.4 maf in the Maximum Flow Alternative as compared to an average annual Delta outflow of ~~14.9~~ 47.7 maf in the No-Action Alternative.

CVP DELIVERIES *(NO CHANGE)*

Technical Memorandum: Existing Conditions and Flow Evaluation Study Alternative

MODELING BACKGROUND *(NO CHANGE)*

ALTERNATIVE ASSUMPTIONS *(NO CHANGE)*

INSTREAM FLOWS AND DIVERSIONS FROM THE TRINITY RIVER BASIN *(NO CHANGE)*

STORAGE **(CHANGES FOLLOW)**

Shasta Reservoir
pg. 4

In the Winter-Run Biological Opinion, the minimum end-of-water year storage in Shasta Reservoir is specified as 1.9 maf, except in the 10 percent driest years when reconsultation between Reclamation and the National Marine Fisheries Service would occur. This 1.9 maf storage criterion is met in over 90 percent of the years in the Existing Conditions Simulation. In the Flow Evaluation Study Alternative, end-of-water year storage in Shasta Reservoir is below 1.9 maf in 12 percent of the years.

DELTA FLOWS AND EXPORTS **(CHANGES FOLLOW)**

Delta Inflow and Outflow
pg. 5

Frequency distributions of simulated annual Delta inflow and outflow volumes are presented in Figures TM3b-6 and 8. The average annual Delta inflow and outflow volumes for the dry, wet, and overall simulation periods are presented in Figures TM3b-7 and 9. Due to the magnitude of scale, it is difficult to see the differences between the simulations. Average annual inflows and outflows are presented in Table TM3b-1. In comparison to the Existing Conditions Simulation, average annual inflows during the 69-year simulation period are reduced by approximately ~~220~~ 200 taf or 1 percent, and average annual outflows during the 69-year simulation period are reduced by approximately 560 taf or 4 percent.

Exports Through Tracy Pumping Plant

Frequency distributions of simulated annual exports and average annual exports through Tracy Pumping Plant are presented in Figures TM3b-10 and 11. A summary of the average annual exports is presented in Table TM3b-1. Exports in the Flow Evaluation Study Alternative are less than those in the Existing Conditions Simulation due to the reduction in Trinity River Basin diversions. In comparison the Existing Conditions Simulation, average annual exports are reduced by approximately ~~80~~ 90 taf or 3 percent.

Exports Through Banks Pumping Plant

Frequency distributions of simulated annual exports and average annual exports through Banks Pumping Plant are presented in Figures TM3b-12 and 13. A summary of the average annual exports is shown in Table TM3b-1. In comparison to the Existing Conditions Simulation, average annual Banks exports are increased in the Flow Evaluation Study Alternative

in an attempt to meet SWP demands at the 2022 level of development. In comparison to the Existing Conditions Simulation, average annual exports increase by approximately ~~400~~410 taf or 14 percent.

CVP DELIVERIES **(CHANGES FOLLOW)**

Total CVP Deliveries

The average annual total CVP deliveries north and south of the Delta and diversions from the Trinity River Basin for the wet, dry, and overall simulation periods are presented in Table TM3b-1. CVP water deliveries are a function of hydrologic conditions in both the Trinity River and Sacramento River basins. In the EIS/EIR, Trinity River Basin diversions to the Sacramento River Basin are determined based on the minimum required Trinity River flows, minimum reservoir storage levels, minimum diversion targets, and CVP requirements (e.g., CVP deliveries, Delta water quality requirements, Winter-Run Biological Opinion temperature requirements, and other obligations). CVP water deliveries are also a function of the water demands at different projected levels of development. Between the 1995 and 2022 levels of development, annual M&I water service contracts and water rights increase approximately ~~295~~320 taf north of the Delta. Although annual agricultural water service and water rights contract amounts do not change between the 1995 and 2022 levels of development, annual demands are based on DWR's Depletion Analysis and increase approximately 40 taf north of the Delta. Changes in CVP water deliveries are also influenced by differences in carryover storage conditions in Shasta, Folsom, and Whiskeytown reservoirs.

SWP DELIVERIES *(NO CHANGE)*

Assessment of the Hoopa Valley Tribe Water Temperature Objectives in Relation to Alternatives of the Trinity River EIS/EIR

Introduction

On May 17, 1996, the U.S. Environmental Protection Agency (EPA) granted Program Authorization to the Hoopa Valley Tribe with respect to Section 303 of the Clean Water Act. Since that time, the Hoopa Valley Tribe has pursued development of a Water Quality Control Plan (WQCP) through the Hoopa Valley Tribe Environmental Protection Agency (Hoopa EPA). An important component of the WQCP is water temperature criteria for waters within the Reservation, which includes part of the mainstem Trinity River as well as several tributaries to the river. Please note that the temperature criteria presented in Table 1 were adopted by the Hoopa Valley Tribal Council (HVTC) on June 8, 2000; but at the time this document was prepared, the criteria remain to be approved by EPA.

TABLE 1
Water Temperature Criteria of the Hoopa Valley Tribe Water Quality Control Plan for the Mainstem Trinity River

Water-year Class	Time Periods			
Extremely Wet, Wet, and Normal	May 23 - Jun 4	Jun 5 - Jul 9	Jul 10 - Sep 14	Sep 15 - Oct 31	Nov 1 - May 22
Criteria [a]	15.0	17.0	22.1	19.0	13.0
Dry and Critically Dry	May 23 - Jun 4	Jun 5 - Jun 15	Jun 16 - Sep 14	Sep 15 - Oct 31	Nov 1 - May 22
Criteria [a]	17.0	20.0	23.5	19.0	15.0

[a]Criteria represent 7-day running averages and are not to be exceeded.

Methods

The SNTEMP model of the Trinity River (Zedonis, 1997), a 7-day average daily model, was used to assess water temperatures of the Trinity River at Weitchpec (River Mile 0.0) for the different alternatives of the Trinity River EIS/ EIR. SNTEMP output, although representing independent 7-day average daily water temperatures rather than the criteria of 7-day running averages as prescribed in the WQCP, was assumed adequate for evaluating relative differences of alternatives in meeting the water temperature criteria. Input to the SNTEMP model included dam-release patterns from the operations model, PROSIM, and Lewiston Dam release water temperatures predicted from upstream models including the Reservoir Temperature Model (RTM) and the Box Exchange Transport Temperature and Ecology of Reservoirs Model (BETTER). Lewiston Dam release magnitudes typically followed the prescribed flow pattern of each alternative. However, in some instances dam releases were greater than those prescribed by an alternative due to spills or safety-of-dam releases. Release water temperatures and flows used in the SNTEMP model are provided at the end of this document in Tables A – E. For more detail on methods and results of these other models, please refer to the attachment, "Temperature Analysis of Proposed Trinity River

Fish and Wildlife Restoration Flow Alternatives using the BETTER Model," located in the DEIS/EIR Technical Appendix A.

SNTEMP simulations were performed for each alternative and each of five water-year classes identified in the DEIS/EIR. Eight alternatives were evaluated with the SNTEMP model and they included: State Permit, No Action, Percent Inflow, Flow Evaluation, Maximum Flow, Existing Conditions, and two Cumulative Effects alternatives. The Existing Conditions alternative was represented by the No Action river release schedule and reflected a 1995 level of development. Cumulative Effects alternatives were represented by river release schedules similar to those of the Flow Evaluation but differed by having end-of-year carryover storage in Trinity Reservoir of 400 thousand acre-feet (taf) and 600 taf. In total, forty model runs were performed. Simulations were conducted with hydrologic (i.e., tributary accretion) and meteorologic conditions represented by water year 1977 (critically dry), 1990 (dry), 1989 (normal), 1986 (wet), and 1983 (extremely wet). These years were selected from the historic record available to the SNTEMP model of the Trinity River and also were chosen for evaluations using the BETTER model.

Results

Critically Dry Year (1977)

Model results for the Critically Dry Year (1977) indicate that relative to the No Action Alternative, which had 6 weeks exceeding the criteria, the Maximum Flow, Flow Evaluation and Cumulative (600K) Alternatives had 0, 4, and 4 weeks that exceeded the criteria, respectively (see Table F). Similar to the No Action Alternative, the Existing Conditions, Cumulative (400K), and State Permit Alternatives had 6 weeks that exceeded the criteria, respectively. The Percent Inflow Alternative had 7 weeks that exceeded the water temperature criteria. All violations occurred during the months of July and August.

Dry Year (1990)

Model results for the Dry Year (1990) indicate that relative to the No Action Alternative, which had 4 weeks exceeding the criteria, the Maximum Flow, Flow Evaluation, and Cumulative (600K and 400K) Alternatives had 1, 3, 3, and 3 weeks that exceeded the criteria, respectively (see Table G). Similar to the No Action Alternative, the Existing Conditions alternative had the same number of weeks (4) that exceeded the criteria. The Percent Inflow and State Permit Alternatives had 6 and 8 weeks that exceeded the criteria, respectively. Temperature violations, where they occurred, were restricted to the first 2 weeks in May, between early July and early August, and during the last week of September.

Normal Year (1989)

Model results for the Normal Year (1989) indicate that relative to the No Action Alternative, which had 16 weeks exceeding the criteria, the Maximum Flow, Flow Evaluation, and Cumulative (600K and 400K) Alternatives had 3, 8, 7, and 10 weeks that exceeded the criteria, respectively (see Table H). Similar to the No Action Alternative, the Existing Conditions alternative had the same number of weeks (16) that exceeded the criteria. The Percent Inflow and State Permit Alternatives had 15 and 18 weeks that exceeded the criteria, respectively. Temperature violations occurred in April and mid to late August. Examination of the meteorology for April revealed air temperatures were very warm.

Wet (1986)

Model results for the Wet Year (1986) indicate that relative to the No Action Alternative, which had 14 weeks exceeding the criteria, the Maximum Flow, Flow Evaluation, and Cumulative (600K and 400K) Alternatives had 3, 4, 4, and 4 weeks that exceeded the criteria, respectively (see Table I). While the Existing Conditions alternative had the same number of weeks as the No Action Alternative that exceeded the criteria, the Percent Inflow and State Permit Alternatives had 12 and 16 weeks that exceeded the criteria, respectively. There was one exception: weekly violations occurred in early May and mid August.

Extremely Wet (1983)

Model results for the Extremely Wet Year (1983) indicate that the No Action, Flow Evaluation, Existing Conditions, and Cumulative (600K and 400K) Alternatives had zero weeks that exceeded the criteria (see Table J). The Maximum Flow Alternative had the largest number of weeks not meeting the criteria (5); this is explained by the warm Lewiston Dam releases (see Table E) that occur during early July (> 12 º C) and August and September (> 15 º C). The State Permit and Percent Inflow Alternatives both had 3 weeks that exceeded the criteria, with violations occurring in mid May and early August.

Summary

Results of the modeling show the variability of meeting the objectives for five differing hydrologic year classes and alternative flow regimes represented by each alternative (Table 2). On average, the No Action, the Maximum Flow, Flow Evaluation, and Cumulative Alternatives (based on Trinity River Flow Evaluation Study [TRFES] flows), met the Hoopa Valley Tribe criteria a larger percentage of time (91 to 96 percent). Other alternatives such as the No Action, Existing Conditions, Percent Inflow, and State Permit met the Hoopa Valley Tribe criteria a smaller percentage of time (78 to 83 percent). The time periods of most frequent violation were July and August.

References

Zedonis, P. 1997. A Water Temperature Model of the Trinity River. U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata, CA. 96 pp.

TABLE 2
Percentage of the Year that Water Temperatures of the Trinity River Would Meet the Water Temperature Objectives Identified in the Hoopa Valley Tribe WQCP

Water Year	Expected No. of Occurrences Per 100 Years	Modeled Year	Alternatives							
			State Permit	No Action	Percent Inflow	Flow Evaluation	Maximum Flow	Exist. Cond.	Cum. 400K[a]	Cum. 600K[a]
C.Dry	12	1977	88	88	87	92	100	88	88	92
Dry	28	1990	85	92	88	94	98	92	94	94
Normal	20	1989	65	69	71	85	94	69	81	87
Wet	28	1986	69	73	77	92	94	73	92	92
E.Wet	12	1983	94	100	94	100	90	100	100	100
Wt. Avg.	-	-	78	83	82	92	96	83	91	93

[a]Flow schedules are identical to the Flow Evaluation Alternative. These alternatives, which utilize different minimum carryover storages in Trinity Reservoir, were evaluated for the influence of altered diversion patterns on the Hoopa EPA criteria.

Table A. Lewiston Dam release water temperatures and magnitudes for a CRITICALLY DRY year. Values are derived from PROSIM 99 and BETTER model output. These data represent input data to SNTEMP for evaluation of HVT Objectives

Critically Dry Year	State Permit Alternative		No Action Alternative		% Inflow Alternative		Flow Study Alternative		Max Flow Alternative		Existing Conditions		Cumulative 400 TAF Carryover		Cumulative 600 TAF Carryover	
	Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release	
Week	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)
10/1/76	200	13.6	300	13.6	54	10.9	451	10.4	300	11.4	300	14.3	451	12.9	451	11.0
10/8/76	200	9.5	300	9.6	69	10.3	451	9.8	300	11.7	300	11.1	451	10.3	451	10.1
10/15/76	200	8.7	300	8.9	86	9.5	322	9.3	300	11.7	300	9.8	322	9.9	322	9.3
10/22/76	200	8.5	300	8.7	78	9.2	301	8.8	300	12.0	300	9.2	301	9.9	301	8.8
10/29/76	204	8.3	300	8.5	158	8.8	300	8.7	300	11.3	300	8.9	300	9.9	300	8.7
11/5/76	257	8.3	300	8.5	122	8.6	300	8.5	300	10.7	300	8.7	300	9.9	300	8.5
11/12/76	257	8.3	300	8.6	169	8.4	300	8.4	300	10.3	300	8.6	300	10.0	300	8.4
11/19/76	257	8.4	300	8.7	312	8.2	300	8.3	300	10.1	300	8.6	300	10.1	300	8.3
11/26/76	254	8.2	300	8.5	230	8.0	300	8.0	300	9.6	300	8.3	300	9.8	300	8.0
12/3/76	197	7.8	300	8.0	232	7.5	300	7.5	300	8.8	300	7.9	300	9.4	300	7.5
12/10/76	197	7.7	300	8.0	383	7.4	300	7.5	300	8.3	300	7.9	300	9.7	300	7.5
12/17/76	197	7.6	300	7.9	358	7.3	300	7.4	300	8.0	300	7.8	300	9.8	300	7.4
12/24/76	197	7.3	300	7.5	268	6.9	300	7.1	300	7.5	300	7.4	300	9.3	300	7.1
12/31/76	191	6.9	300	7.1	241	6.6	300	6.7	299	6.9	300	7.0	300	8.5	300	6.7
1/7/77	140	6.4	300	6.6	256	6.1	300	6.3	299	6.3	300	6.7	300	7.6	300	6.3
1/14/77	140	6.3	300	6.7	273	6.1	300	6.3	299	6.1	300	6.8	300	7.1	300	6.4
1/21/77	140	6.7	300	6.9	271	6.4	300	6.6	299	6.2	300	7.1	300	7.1	300	6.7
1/28/77	144	7.1	300	7.3	384	6.9	300	7.1	1900	7.5	300	7.4	300	7.3	300	7.1
2/4/77	150	7.3	300	7.7	314	7.7	300	7.7	1950	7.7	300	7.7	300	7.7	300	7.7
2/11/77	150	7.8	300	7.9	519	8.1	300	8.3	2000	7.9	300	7.9	300	8.2	300	8.3
2/18/77	150	7.9	300	7.8	617	8.4	300	8.5	2000	7.8	300	7.8	300	8.3	300	8.5
2/25/77	150	7.8	300	7.7	398	8.0	300	8.4	1271	7.5	300	7.6	300	8.1	300	8.4
3/4/77	150	7.9	300	7.9	210	7.3	300	8.4	300	7.9	300	7.9	300	8.1	300	8.4
3/11/77	150	7.8	300	8.2	381	7.1	300	8.5	300	8.4	300	8.2	300	8.4	300	8.5
3/18/77	150	8.2	300	8.7	429	7.3	300	8.8	300	9.4	300	8.7	300	8.7	300	8.8
3/25/77	150	8.3	300	9.0	567	7.4	300	9.0	300	9.9	300	9.0	300	9.0	300	9.0
4/1/77	150	9.2	300	9.4	491	7.8	300	9.3	300	10.4	300	9.4	300	9.3	300	9.3
4/8/77	150	10.1	300	9.8	565	9.0	300	9.7	300	11.3	300	9.8	300	9.7	300	9.5
4/15/77	150	11.1	300	10.3	542	9.9	300	10.3	300	11.6	300	10.3	300	10.3	300	10.1
4/22/77	150	11.0	300	10.5	518	10.1	1243	9.8	300	12.0	300	10.5	1243	9.8	1243	9.6
4/29/77	150	9.5	300	9.3	578	9.0	1505	8.9	300	12.4	300	9.4	1505	9.1	1505	8.4
5/6/77	150	8.0	300	7.9	696	7.7	1507	8.1	300	12.1	300	7.9	1507	8.7	1507	7.7
5/13/77	150	8.1	857	7.8	608	7.7	1507	8.3	1250	11.7	857	7.8	1507	8.9	1507	7.8
5/20/77	150	8.2	4714	8.0	562	7.8	1507	8.4	2000	9.4	4714	8.0	1507	8.9	1507	7.9
5/27/77	150	8.4	1343	8.0	574	8.0	1448	8.5	2000	9.4	1343	8.0	1448	9.0	1448	8.1
6/3/77	150	8.7	800	8.5	392	8.3	1097	8.3	2000	10.1	800	8.4	1097	8.3	1097	8.7
6/10/77	150	8.8	607	8.5	303	8.3	804	8.3	2000	10.1	607	8.5	804	8.3	804	8.7
6/17/77	150	8.9	386	8.9	267	8.4	589	8.4	2000	10.1	386	8.9	589	8.7	589	8.8
6/24/77	150	9.2	300	9.9	273	8.8	454	8.7	2000	10.5	300	9.8	454	9.6	454	9.1
7/1/77	150	9.5	450	11.0	147	9.8	450	8.7	900	11.0	450	11.0	450	10.8	450	9.3
7/8/77	150	9.8	450	12.2	100	10.7	450	8.6	900	12.1	450	12.2	450	11.8	450	9.4
7/15/77	150	10.5	450	13.3	74	12.6	450	9.0	900	12.5	450	13.3	450	12.7	450	9.7
7/22/77	150	10.7	450	13.9	62	12.9	450	9.0	900	12.1	450	13.9	450	13.4	450	9.7
7/29/77	150	11.6	450	14.3	51	13.9	450	9.2	900	12.0	450	14.3	450	13.7	450	9.7
8/5/77	150	12.7	450	15.5	42	16.1	450	10.5	900	13.0	450	15.3	450	14.7	450	10.1
8/12/77	150	13.2	450	16.2	38	16.1	450	11.0	900	12.3	450	16.0	450	15.3	450	10.1
8/19/77	150	13.9	450	16.5	34	16.6	450	11.2	900	12.2	450	16.2	450	15.6	450	10.2
8/26/77	150	14.5	450	16.6	33	16.3	450	11.3	900	12.2	450	16.4	450	15.7	450	10.3
9/2/77	150	15.5	450	17.4	33	15.8	450	11.7	900	12.4	450	17.2	450	16.5	450	10.7
9/9/77	150	16.2	450	18.0	30	16.1	450	12.1	900	12.4	450	17.9	450	17.2	450	11.3
9/16/77	150	16.0	450	17.0	29	13.9	450	11.4	300	12.4	450	17.1	450	16.5	450	11.0
9/23/77	150	16.6	450	16.5	50	13.9	450	11.1	300	12.5	450	16.6	450	15.9	450	11.2

Table B. Lewiston Dam release water temperatures and magnitudes for a DRY year. Values are derived from PROSIM 99 and BETTER model output. These data represent input data to SNTEMP for evaluation of HVT Objectives

Dry Year	State Permit Alternative		No Action Alternative		% Inflow Alternative		Flow Study Alternative		Max Flow Alternative		Existing Conditions		Cumulative 400 TAF Carryover		Cumulative 600 TAF Carryover	
	Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release	
Week	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)
10/1/89	200	9.2	300	12.0	70	10.6	451	10.2	300	14.2	300	9.6	451	14.2	451	11.2
10/8/89	200	9.2	300	10.1	77	10.5	451	10.1	300	13.5	300	9.0	451	13.3	451	11.6
10/15/89	200	9.0	300	9.1	82	10.2	322	10.3	300	12.7	300	8.6	322	13.0	322	11.8
10/22/89	200	8.3	300	8.2	129	8.1	301	9.7	300	11.1	300	7.9	301	11.9	301	11.2
10/29/89	204	7.9	300	7.5	93	8.0	300	9.2	300	10.0	300	7.4	300	11.0	300	10.5
11/5/89	257	7.8	300	7.5	134	7.9	300	9.2	300	9.1	300	7.4	300	10.8	300	10.3
11/12/89	257	7.7	300	7.5	194	7.6	300	9.3	300	8.8	300	7.4	300	10.9	300	10.5
11/19/89	257	7.5	300	7.3	291	7.2	300	9.3	300	8.4	300	7.3	300	10.9	300	10.5
11/26/89	254	6.9	300	6.7	275	6.6	300	8.5	300	7.8	300	6.7	300	9.8	300	9.4
12/3/89	197	6.7	300	6.5	284	6.3	300	8.1	300	7.4	300	6.4	300	9.1	300	8.8
12/10/89	197	6.6	300	6.5	263	6.3	300	8.1	300	7.1	300	6.5	300	8.7	300	8.6
12/17/89	197	6.7	300	6.6	227	6.4	300	8.0	300	7.0	300	6.6	300	8.2	300	8.2
12/24/89	197	6.7	300	6.6	324	6.4	300	7.8	300	6.8	300	6.6	300	7.7	300	7.8
12/31/89	191	6.3	300	6.2	311	6.0	300	7.1	299	6.4	300	6.2	300	7.0	300	7.2
1/7/90	140	5.9	300	5.8	313	5.6	300	6.4	2999	6.2	300	5.7	300	6.3	300	6.5
1/14/90	140	5.8	300	5.8	770	5.9	300	6.2	2999	6.2	300	5.7	300	6.1	300	6.2
1/21/90	140	5.9	300	6.0	634	6.2	300	6.2	2999	6.2	300	6.0	300	6.0	300	6.2
1/28/90	144	5.9	300	6.0	558	5.9	300	6.1	2999	5.7	300	6.1	300	6.1	300	6.2
2/4/90	150	5.4	300	5.3	635	5.2	300	5.4	2999	5.6	300	5.4	300	5.4	300	5.5
2/11/90	150	5.3	300	5.2	835	5.6	300	5.3	2999	5.6	300	5.3	300	5.2	300	5.3
2/18/90	150	5.2	300	5.2	738	5.3	300	5.2	2999	5.8	300	5.2	300	5.2	300	5.2
2/25/90	150	5.4	300	5.6	854	6.7	300	5.7	2571	6.5	300	5.6	300	5.6	300	5.7
3/4/90	150	5.8	300	6.3	565	7.2	300	6.7	2000	6.3	300	6.3	300	6.4	300	6.5
3/11/90	150	6.5	300	6.8	763	7.0	300	7.4	2000	6.1	300	6.8	300	6.8	300	6.8
3/18/90	150	6.7	300	6.8	792	7.2	300	7.4	2000	7.1	300	6.8	300	6.7	300	6.7
3/25/90	150	7.0	300	7.1	770	8.5	300	7.8	2000	7.5	300	7.1	300	7.0	300	7.1
4/1/90	150	7.4	300	7.7	880	8.3	229	8.5	1999	7.7	300	7.7	229	7.5	229	7.6
4/8/90	150	7.6	300	8.0	1085	7.8	229	8.6	2099	7.7	300	8.0	229	7.8	229	7.9
4/15/90	150	7.8	300	8.0	1235	7.6	229	8.4	2499	7.5	300	8.0	229	7.9	229	8.0
4/22/90	150	7.9	300	7.8	1282	7.4	486	8.1	2899	7.0	300	7.8	486	7.9	486	7.9
4/29/90	150	8.2	300	8.3	1266	7.7	4107	7.3	3800	7.1	300	8.2	4107	7.0	4107	7.3
5/6/90	150	7.5	300	7.4	1306	7.7	3867	7.1	2500	7.7	300	7.4	3867	6.6	3867	7.2
5/13/90	150	7.2	857	7.0	1234	7.4	2862	7.1	2300	7.7	857	7.0	2862	6.6	2862	7.3
5/20/90	150	6.8	4714	6.2	1198	7.0	2124	6.6	2100	7.1	4714	6.2	2124	6.2	2124	6.8
5/27/90	150	6.5	1343	6.1	1051	6.7	1557	6.7	2000	7.1	1343	6.1	1557	6.3	1557	6.9
6/3/90	150	6.7	800	6.6	969	7.1	1093	7.2	2000	8.2	800	6.7	1093	7.0	1093	7.6
6/10/90	150	7.0	607	6.8	723	7.4	800	7.8	2000	8.8	607	7.0	800	7.5	800	8.6
6/17/90	150	7.1	386	6.7	573	7.4	585	7.8	2000	9.0	386	6.9	585	7.7	585	8.7
6/24/90	150	7.2	300	6.9	416	7.7	450	8.0	2000	9.7	300	7.1	450	8.5	450	8.4
7/1/90	150	7.7	450	7.3	285	8.8	450	8.4	2000	10.1	450	7.5	450	9.7	450	8.9
7/8/90	150	7.4	450	7.4	202	9.1	450	7.9	1500	10.7	450	7.5	450	10.6	450	8.2
7/15/90	150	7.4	450	7.6	150	9.9	450	8.1	1100	12.0	450	7.7	450	11.5	450	8.5
7/22/90	150	7.5	450	7.7	118	10.6	450	8.2	700	12.7	450	7.7	450	12.1	450	8.5
7/29/90	150	7.6	450	8.0	93	9.9	450	8.5	700	13.6	450	8.0	450	12.6	450	8.8
8/5/90	150	7.4	450	8.0	83	7.8	450	8.8	700	13.8	450	8.5	450	13.0	450	8.9
8/12/90	150	7.4	450	8.2	72	7.9	450	8.6	700	13.6	450	8.5	450	13.0	450	8.7
8/19/90	150	7.2	450	8.5	65	7.7	450	8.3	700	13.2	450	8.1	450	13.0	450	8.5
8/26/90	150	7.3	450	9.1	58	7.9	450	8.4	700	13.4	450	8.0	450	13.1	450	8.7
9/2/90	150	8.5	450	10.3	55	10.3	450	9.0	700	13.5	450	8.7	450	13.8	450	9.4
9/9/90	150	9.0	450	11.3	52	10.5	450	9.4	700	13.6	450	9.3	450	14.2	450	10.0
9/16/90	150	8.9	450	11.9	50	10.1	450	9.7	300	14.1	450	9.3	450	14.2	450	10.3
9/23/90	150	8.9	450	12.3	50	9.7	450	9.9	300	14.1	450	9.5	450	14.3	450	10.6

Table C. Lewiston Dam release water temperatures and magnitudes for a NORMAL year. Values are derived from PROSIM 99 and BETTER model output. These data represent input data to SNTEMP for evaluation of HVT Objectives

Normal Year	State Permit Alternative		No Action Alternative		% Inflow Alternative		Flow Study Alternative		Max Flow Alternative		Existing Conditions		Cumulative 400 TAF Carryover		Cumulative 600 TAF Carryover	
	Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release	
Week	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)
10/1/88	200	8.2	300	8.9	54	10.7	451	9.3	300	11.4	300	9.0	451	12.2	451	10.7
10/8/88	200	8.9	300	9.7	69	11.7	451	10.1	300	11.9	300	9.8	451	13.0	451	11.9
10/15/88	200	9.3	300	10.4	86	10.5	322	10.4	300	11.6	300	10.4	322	13.2	322	12.4
10/22/88	200	9.8	300	10.7	78	11.3	301	10.6	300	11.3	300	10.8	301	13.4	301	12.6
10/29/88	204	9.7	300	10.7	158	8.8	300	10.5	300	10.6	300	10.8	300	13.2	300	12.5
11/5/88	257	9.3	300	10.6	122	8.8	300	10.2	300	9.8	300	10.6	300	12.9	300	12.0
11/12/88	257	8.8	300	10.1	169	8.0	300	9.7	300	9.1	300	10.1	300	12.3	300	11.4
11/19/88	257	8.2	300	9.5	312	7.7	300	9.0	300	8.6	300	9.4	300	11.3	300	10.5
11/26/88	254	7.9	300	8.9	230	7.5	300	8.5	300	7.8	300	8.9	300	10.4	300	9.6
12/3/88	197	7.8	300	8.8	232	7.5	300	8.4	300	7.3	300	8.7	300	9.8	300	9.3
12/10/88	197	7.9	300	8.5	383	7.6	300	8.4	300	7.1	300	8.5	300	9.1	300	8.8
12/17/88	197	7.6	300	7.8	358	7.4	300	7.8	300	7.0	300	7.8	300	8.0	300	8.1
12/24/88	197	6.4	300	6.4	268	6.2	300	6.5	300	5.9	300	6.4	300	6.2	300	6.5
12/31/88	191	5.1	300	5.0	241	4.9	300	5.1	299	4.5	300	5.0	300	4.5	300	4.9
1/7/89	140	4.3	300	4.3	256	4.3	300	4.4	299	3.8	300	4.3	300	3.9	300	4.1
1/14/89	140	4.9	300	4.6	273	4.6	300	4.7	299	4.1	300	4.6	300	4.2	300	4.4
1/21/89	140	5.2	300	5.2	271	5.0	300	5.3	299	4.6	300	5.2	300	4.6	300	4.9
1/28/89	144	5.4	300	5.7	384	5.7	300	5.8	1900	6.0	300	5.8	300	5.3	300	5.6
2/4/89	150	5.2	300	5.8	314	5.9	300	5.9	1950	5.4	300	5.8	300	5.6	300	5.8
2/11/89	150	5.9	300	5.7	519	5.6	300	5.8	2000	5.9	300	5.7	300	5.6	300	5.8
2/18/89	150	6.7	300	6.2	617	6.3	300	6.2	2000	6.0	300	6.2	300	6.0	300	6.2
2/25/89	150	7.4	300	6.9	769	6.9	300	7.0	2428	6.4	300	6.9	300	6.6	300	6.8
3/4/89	150	7.2	300	7.0	1120	6.4	300	7.0	2999	5.7	300	7.0	300	6.7	300	6.9
3/11/89	150	7.6	300	7.2	1311	6.4	300	7.2	2999	6.2	300	7.1	300	6.9	300	7.1
3/18/89	150	8.1	300	7.6	1296	6.6	300	7.6	2999	6.2	300	7.6	300	7.3	300	7.5
3/25/89	150	8.4	300	7.8	1156	6.7	300	7.8	2999	6.2	300	7.8	300	7.5	300	7.7
4/1/89	150	8.6	300	8.2	1306	7.1	300	8.3	2999	6.7	300	8.2	300	8.2	300	8.2
4/8/89	150	9.4	300	9.2	1406	8.0	300	9.2	2999	7.4	300	9.1	300	9.5	300	9.1
4/15/89	150	9.8	300	9.8	1563	8.1	300	9.9	2999	7.4	300	9.8	300	10.6	300	9.7
4/22/89	150	9.6	300	9.6	1740	7.1	500	9.0	2999	6.5	300	9.5	500	10.0	500	8.9
4/29/89	150	9.3	300	8.9	1551	7.4	2512	7.8	4214	6.7	300	8.8	2512	7.5	2512	7.5
5/6/89	150	8.9	300	8.2	1569	8.1	5700	6.5	5428	6.5	300	8.1	5700	6.0	5700	6.4
5/13/89	150	8.9	857	7.3	1613	8.1	5022	6.6	3999	6.8	857	7.2	5022	6.1	5022	6.4
5/20/89	150	9.0	4714	6.5	1555	8.5	3884	6.8	2713	7.3	4714	6.5	3884	6.5	3884	6.6
5/27/89	150	8.2	1343	6.6	1241	8.2	2995	7.1	2299	7.5	1343	6.6	2995	6.9	2995	6.9
6/3/89	150	7.2	800	7.0	1200	7.8	2291	7.3	2000	8.5	800	7.3	2291	7.3	2291	7.3
6/10/89	150	7.2	607	7.2	1041	7.9	1982	7.6	2000	8.8	607	7.7	1982	7.8	1982	7.6
6/17/89	150	7.2	386	7.2	745	7.8	1982	7.5	2000	8.7	386	7.8	1982	8.0	1982	7.6
6/24/89	150	7.1	300	7.5	488	8.3	1982	7.6	2000	9.0	300	8.2	1982	8.5	1982	7.8
7/1/89	150	7.5	450	7.2	342	8.1	2000	7.1	2000	8.6	450	7.3	2000	9.2	2000	7.6
7/8/89	150	7.9	450	7.6	248	8.5	1543	7.4	1500	9.6	450	7.4	1543	10.1	1543	8.0
7/15/89	150	8.2	450	7.8	189	9.0	696	7.7	1200	10.3	450	7.4	696	10.6	696	8.3
7/22/89	150	8.1	450	7.8	147	9.6	450	8.0	800	11.0	450	7.5	450	11.2	450	8.9
7/29/89	150	7.9	450	8.1	115	9.9	450	8.4	650	11.7	450	7.8	450	11.6	450	9.3
8/5/89	150	7.4	450	8.3	96	9.2	450	8.5	650	11.9	450	8.2	450	11.9	450	9.2
8/12/89	150	7.4	450	8.5	84	9.6	450	8.7	650	11.9	450	8.5	450	11.9	450	9.4
8/19/89	150	7.2	450	8.5	75	9.3	450	8.7	650	11.9	450	8.5	450	12.0	450	9.5
8/26/89	150	7.3	450	8.7	70	9.6	450	8.7	650	11.6	450	8.7	450	12.1	450	9.6
9/2/89	150	7.9	450	8.8	64	10.3	450	8.7	650	11.2	450	8.8	450	12.2	450	9.9
9/9/89	150	8.1	450	9.0	58	10.8	450	8.9	650	11.5	450	9.0	450	12.1	450	10.3
9/16/89	150	7.7	450	8.6	55	9.2	450	8.5	300	11.3	450	8.6	450	11.8	450	10.0
9/23/89	150	7.7	450	8.5	73	8.8	450	8.8	300	11.4	450	8.5	450	11.9	450	10.2

Table D. Lewiston Dam release water temperatures and magnitudes for a WET year. Values are derived from PROSIM 99 and BETTER model output. These data represent input data to SNTEMP for evaluation of HVT Objectives

Wet Year	State Permit Alternative		No Action Alternative		% Inflow Alternative		Flow Study Alternative		Max Flow Alternative		Existing Conditions		Cumulative 400 TAF Carryover		Cumulative 600 TAF Carryover	
	Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release	
Week	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)
10/1/85	200	7.9	300	8.6	54	11.7	451	8.6	300	11.4	300	8.0	451	9.5	451	9.3
10/8/85	200	7.4	300	7.9	69	9.9	451	8.4	300	11.0	300	7.2	451	9.2	451	9.6
10/15/85	200	7.2	300	7.8	86	9.9	322	8.2	300	10.4	300	7.3	322	9.1	322	9.8
10/22/85	200	6.8	300	7.6	78	9.2	301	7.9	300	9.6	300	7.2	301	8.8	301	9.5
10/29/85	204	7.0	300	8.0	158	9.1	300	7.9	300	9.5	300	7.7	300	8.8	300	9.6
11/5/85	257	7.1	300	8.4	122	9.4	300	7.9	300	9.2	300	8.1	300	8.8	300	9.7
11/12/85	257	6.9	300	8.2	169	8.8	300	7.4	300	8.5	300	8.0	300	8.3	300	9.1
11/19/85	257	6.2	300	7.4	312	8.1	300	6.4	300	7.3	300	7.3	300	7.4	300	8.1
11/26/85	254	5.5	300	6.6	230	7.3	300	5.7	300	5.8	300	6.6	300	6.6	300	7.2
12/3/85	197	5.4	300	6.4	232	6.8	300	5.6	300	5.1	300	6.3	300	6.3	300	6.8
12/10/85	197	5.5	300	6.3	383	6.6	300	5.7	300	5.1	300	6.3	300	6.3	300	6.6
12/17/85	197	6.0	300	6.5	358	6.7	300	6.1	300	5.4	300	6.5	300	6.5	300	6.7
12/24/85	197	6.3	300	6.8	268	7.0	300	6.5	300	5.8	300	6.8	300	6.8	300	6.9
12/31/85	191	6.3	300	7.0	241	7.0	300	6.7	299	6.1	300	7.0	300	6.9	300	6.9
1/7/86	140	6.5	300	7.0	256	6.9	300	6.8	299	6.4	300	6.9	300	6.9	300	6.8
1/14/86	140	6.7	300	7.0	273	6.9	300	6.9	299	6.6	300	6.9	300	6.9	300	6.8
1/21/86	140	6.6	300	6.8	271	6.8	300	6.6	299	6.6	300	6.7	300	6.6	300	6.6
1/28/86	144	6.7	300	6.8	384	6.8	300	6.7	1900	6.5	300	6.7	300	6.7	300	6.6
2/4/86	150	6.6	300	6.7	314	6.7	300	6.6	1950	6.4	300	6.6	300	6.6	300	6.5
2/11/86	150	6.8	300	6.8	519	6.9	300	6.8	2000	6.3	300	6.8	300	6.8	300	6.7
2/18/86	150	6.6	300	6.7	617	6.4	300	6.7	2000	6.1	300	6.6	300	6.7	300	6.6
2/25/86	150	6.9	300	6.6	871	7.0	300	6.6	2428	7.3	300	6.6	300	6.6	300	6.5
3/4/86	150	7.4	300	7.5	1401	8.3	300	7.7	2999	7.2	300	7.5	300	7.5	300	7.5
3/11/86	150	6.9	300	8.4	1156	7.2	300	8.0	2999	6.5	300	8.5	300	8.4	300	8.4
3/18/86	150	7.1	300	8.4	1038	7.5	300	7.9	2999	7.2	300	8.5	300	8.4	300	8.4
3/25/86	150	7.6	300	8.9	1018	8.4	300	8.5	2999	7.6	300	8.9	300	8.9	300	8.8
4/1/86	150	8.2	300	9.4	1429	8.4	300	9.3	2999	7.3	300	9.5	300	9.4	300	9.6
4/8/86	150	8.5	300	8.7	1393	8.0	300	9.2	3630	7.2	300	8.7	300	8.7	300	9.2
4/15/86	150	8.7	300	8.6	1635	7.9	300	8.9	4261	7.1	300	8.6	300	8.6	300	9.2
4/22/86	150	9.0	300	8.8	1873	8.1	500	9.0	4892	7.0	300	8.9	500	8.9	500	9.1
4/29/86	150	8.0	300	7.8	2068	7.2	2036	8.0	5523	6.8	300	7.9	2036	7.6	2036	7.8
5/6/86	150	7.0	300	6.9	1994	6.9	2550	7.1	6154	6.9	300	6.9	2550	7.0	2550	6.9
5/13/86	150	7.4	857	7.3	2287	7.3	5907	7.3	6785	7.2	857	7.3	5907	7.2	5907	7.2
5/20/86	150	7.4	4714	7.3	2476	7.2	7121	7.1	6428	7.1	4714	7.3	7121	7.1	7121	7.1
5/27/86	150	7.8	1343	7.5	2335	7.7	5306	7.6	4285	8.1	1343	7.5	5306	7.5	5306	7.5
6/3/86	150	7.6	800	7.3	1813	7.3	3309	7.9	3713	8.3	800	7.3	3309	7.7	3309	7.7
6/10/86	150	7.4	607	7.4	1414	7.3	2126	8.2	2713	8.8	607	7.4	2126	7.9	2126	8.0
6/17/86	150	7.4	386	7.3	1088	7.3	1947	8.1	2399	8.9	386	7.3	1947	7.8	1947	7.9
6/24/86	150	7.4	300	7.3	857	7.4	1947	8.2	1999	9.2	300	7.3	1947	8.0	1947	8.0
7/1/86	150	7.5	450	7.4	593	7.7	2000	7.6	2000	9.8	450	7.4	2000	7.9	2000	7.9
7/8/86	150	9.5	450	8.0	430	9.2	1543	7.6	2000	9.9	450	8.0	1543	8.0	1543	8.0
7/15/86	150	9.3	450	8.0	313	9.7	696	8.0	1800	10.0	450	8.0	696	8.5	696	8.5
7/22/86	150	9.2	450	8.0	237	10.1	450	8.4	1000	10.8	450	8.0	450	8.9	450	9.0
7/29/86	150	9.4	450	8.2	181	10.4	450	8.5	900	12.0	450	8.2	450	9.4	450	9.2
8/5/86	150	9.7	450	8.4	145	10.4	450	8.5	900	12.9	450	8.4	450	10.6	450	9.5
8/12/86	150	9.3	450	8.2	118	10.4	450	8.3	800	12.4	450	8.2	450	10.5	450	9.3
8/19/86	150	9.0	450	8.1	102	10.5	450	8.2	670	11.9	450	8.1	450	10.3	450	9.2
8/26/86	150	9.2	450	8.3	93	11.3	450	8.4	650	11.7	450	8.3	450	10.3	450	9.3
9/2/86	150	11.4	450	9.6	97	15.0	450	9.0	650	12.0	450	9.6	450	11.0	450	9.9
9/9/86	150	10.3	450	10.0	84	14.5	450	8.7	650	11.7	450	10.0	450	10.8	450	9.5
9/16/86	150	8.2	450	9.3	81	10.3	450	8.0	300	11.7	450	9.3	450	9.9	450	8.7
9/23/86	150	8.3	450	8.9	92	10.2	450	8.1	300	11.2	450	8.9	450	9.5	450	8.7

Table E. Lewiston Dam release water temperatures and magnitudes for an EXTREMELY WET year. Values are derived from PROSIM 99 and BETTER model output. These data represent input data to SNTEMP for evaluation of HVT Objectives

Extremely Wet Year	State Permit Alternative		No Action Alternative		% Inflow Alternative		Flow Study Alternative		Max Flow Alternative		Existing Conditions		Cumulative 400 TAF Carryover		Cumulative 600 TAF Carryover	
	Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release		Lewiston Dam Release	
Week	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)	Q (cfs)	Temp (°C)
10/1/82	200	7.6	300	7.4	152	7.8	451	9.5	300	15.1	300	7.4	451	9.6	451	9.5
10/8/82	200	6.4	300	6.2	145	6.7	451	8.3	300	14.5	300	6.2	451	8.2	451	8.2
10/15/82	200	6.4	300	6.2	270	6.3	322	8.4	300	14.5	300	6.3	322	8.4	322	8.4
10/22/82	200	6.0	300	5.9	196	6.0	301	8.0	300	13.9	300	5.9	301	7.9	301	7.9
10/29/82	204	6.0	300	5.8	520	5.8	300	7.5	300	13.4	300	5.9	300	7.4	300	7.5
11/5/82	257	6.3	300	6.2	963	6.3	300	7.4	300	12.6	300	6.3	300	7.4	300	7.4
11/12/82	257	6.2	300	6.2	886	6.2	300	7.1	300	11.9	300	6.2	300	7.0	300	7.0
11/19/82	257	5.8	300	5.8	972	5.8	300	6.5	300	10.8	300	5.8	300	6.5	300	6.5
11/26/82	254	5.7	300	5.7	1060	5.8	300	6.1	325	9.7	300	5.7	300	6.1	300	6.1
12/3/82	197	5.8	300	5.8	879	5.8	300	5.8	387	8.8	300	5.8	300	5.8	300	5.8
12/10/82	197	6.0	300	5.9	1021	6.0	300	5.9	387	8.2	300	5.9	300	5.8	300	5.8
12/17/82	197	6.0	300	5.9	1053	5.9	300	5.8	387	7.4	300	5.9	300	5.8	300	5.8
12/24/82	197	5.8	300	5.8	1748	5.9	300	5.7	387	6.6	300	5.8	300	5.7	300	5.7
12/31/82	191	6.0	300	6.0	1478	6.0	300	5.9	822	6.3	300	6.0	300	5.8	300	5.9
1/7/83	140	6.1	300	6.0	1330	6.0	300	6.0	3522	5.8	300	6.0	300	5.9	300	6.0
1/14/83	140	6.0	300	5.9	1369	6.0	300	5.9	3522	5.4	300	5.9	300	5.9	300	5.9
1/21/83	140	5.9	300	5.8	1817	5.8	300	5.8	3522	5.3	300	5.8	300	5.8	300	5.8
1/28/83	144	5.9	300	5.8	1745	5.8	300	5.8	3298	5.4	300	5.8	300	5.8	300	5.8
2/4/83	150	5.8	300	5.7	1568	5.7	300	5.7	2999	5.3	300	5.7	300	5.7	300	5.7
2/11/83	150	5.8	300	5.7	1706	5.8	300	5.7	2999	5.5	300	5.7	300	5.7	300	5.7
2/18/83	150	5.9	300	5.8	1721	5.9	300	5.8	2999	5.7	300	5.8	300	5.8	300	5.8
2/25/83	1702	5.8	1788	5.8	2632	5.8	1788	5.8	2999	5.6	1788	5.8	1788	5.8	1788	5.8
3/4/83	3772	5.9	3772	5.9	4331	5.9	3772	5.9	2999	5.9	3772	5.9	3772	5.9	3772	5.9
3/11/83	3772	5.8	3772	5.8	3663	5.9	3772	5.8	2999	5.9	3772	5.8	3772	5.8	3772	5.8
3/18/83	3772	6.0	3772	6.0	3535	6.0	3772	6.0	2999	6.0	3772	6.0	3772	6.0	3772	6.0
3/25/83	3772	5.9	3772	5.9	3457	5.9	3772	5.9	2999	6.0	3772	5.9	3772	5.9	3772	5.9
4/1/83	150	6.5	300	6.3	2087	6.5	300	6.3	2999	6.1	300	6.3	300	6.3	300	6.3
4/8/83	150	7.2	300	7.0	1982	7.0	300	7.1	4440	5.9	300	7.0	300	7.0	300	7.0
4/15/83	150	7.4	300	7.2	1788	7.2	300	7.3	5881	5.9	300	7.2	300	7.3	300	7.3
4/22/83	150	7.6	300	7.3	1949	7.1	500	7.2	7322	6.0	300	7.3	500	7.1	500	7.1
4/29/83	3063	6.6	2184	6.6	2606	6.4	1560	6.4	8761	6.5	2184	6.6	1560	6.4	1560	6.4
5/6/83	4229	6.2	2938	6.2	3179	6.2	2084	6.2	10202	6.9	2938	6.2	2084	6.2	2084	6.2
5/13/83	4229	6.4	3495	6.5	3534	6.5	2084	6.4	11640	7.4	3495	6.5	2084	6.4	2084	6.4
5/20/83	4229	6.7	7352	6.6	3730	6.8	7871	6.6	27854	7.8	7352	6.6	7871	6.6	7871	6.6
5/27/83	4446	6.6	4488	6.7	4823	6.6	9949	6.5	7926	8.8	4488	6.7	9949	6.5	9949	6.5
6/3/83	4989	6.7	5211	6.7	5752	6.6	6752	6.6	4999	9.7	5211	6.7	6752	6.6	6752	6.6
6/10/83	4989	6.6	5018	6.6	5163	6.6	5380	6.6	4285	10.4	5018	6.6	5380	6.6	5380	6.6
6/17/83	4989	6.9	4797	6.9	4615	6.9	3740	6.9	2642	11.4	4797	6.9	3740	6.9	3740	6.9
6/24/83	4989	7.1	4711	7.1	4109	7.0	2631	7.0	1999	11.8	4711	7.1	2631	7.0	2631	7.0
7/1/83	3499	7.4	3499	7.4	3973	7.3	4397	7.3	2000	12.2	3499	7.4	4397	7.3	4397	7.3
7/8/83	3499	7.7	3499	7.7	3689	7.7	3940	7.6	2000	12.6	3499	7.7	3940	7.7	3940	7.6
7/15/83	3499	7.8	3499	7.8	3391	7.8	3093	7.8	1700	12.9	3499	7.8	3093	7.8	3093	7.8
7/22/83	3499	8.1	3499	8.1	3152	8.1	2847	8.1	1200	13.4	3499	8.1	2847	8.1	2847	8.1
7/29/83	1585	8.5	1757	8.3	1546	8.3	1477	8.3	629	14.4	1757	8.3	1477	8.3	1477	8.3
8/5/83	150	9.0	450	8.8	312	8.8	450	8.8	450	15.6	450	8.8	450	8.7	450	8.8
8/12/83	150	9.2	450	9.0	233	9.0	450	9.0	450	15.6	450	9.0	450	8.9	450	9.0
8/19/83	150	9.2	450	8.9	187	9.1	450	8.9	450	15.6	450	8.9	450	8.8	450	8.9
8/26/83	150	9.4	450	9.1	172	9.3	450	9.1	455	15.9	450	9.1	450	9.0	450	9.1
9/2/83	150	9.4	450	9.2	148	9.4	450	9.2	485	15.6	450	9.2	450	9.1	450	9.2
9/9/83	150	9.5	450	9.4	150	9.5	450	9.4	335	15.5	450	9.4	450	9.3	450	9.4
9/16/83	150	9.7	450	9.6	168	9.7	450	9.6	335	15.4	450	9.6	450	9.6	450	9.6
9/23/83	150	9.8	450	9.7	116	9.9	450	9.7	335	15.5	450	9.7	450	9.7	450	9.7

Table F. Predicted water temperatures of the Trinity River at Weitchpec (RM 0.0) for a **CRITICALLY DRY** year (1977).
SNTEMP utilized dam release water temperatures predicted by the BETTER model that used PROSIM 99 output.
Bolded values represent times that the draft Hoopa Valley Tribe water temperature objectives would not be met.

	Predicted Water Temperatures of the Trinity River at Weitchpec - 1977								HVTEPA[a]
	Alternatives								Criteria
Date	State Permit	NO Action	% Inflow	TRFE	Max Flow	E. Cond.	Cum 400K	Cum. 600K	NTE
01-Oct	15.6	15.5	15.7	15.0	15.4	15.6	15.3	15.1	19.0
08-Oct	14.7	14.5	14.9	14.1	14.7	14.6	14.2	14.2	19.0
15-Oct	12.3	12.1	12.4	12.1	12.4	12.2	12.2	12.1	19.0
22-Oct	10.3	10.3	10.4	10.3	10.6	10.4	10.4	10.3	19.0
29-Oct	9.3	9.3	9.3	9.3	9.5	9.3	9.4	9.3	19.0
05-Nov	8.0	8.1	8.0	8.1	8.2	8.1	8.2	8.1	15.0
12-Nov	7.4	7.4	7.3	7.4	7.6	7.4	7.5	7.4	15.0
19-Nov	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	15.0
26-Nov	5.8	5.8	5.8	5.8	5.9	5.8	5.9	5.8	15.0
03-Dec	5.4	5.5	5.4	5.4	5.5	5.4	5.5	5.4	15.0
10-Dec	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	15.0
17-Dec	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.0	15.0
24-Dec	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	15.0
31-Dec	4.9	4.9	4.9	4.9	4.9	4.9	5.0	4.9	15.0
07-Jan	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	15.0
14-Jan	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	15.0
21-Jan	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	15.0
28-Jan	5.7	5.8	5.8	5.8	6.2	5.8	5.8	5.8	15.0
04-Feb	6.1	6.1	6.1	6.1	6.3	6.1	6.1	6.1	15.0
11-Feb	6.7	6.7	6.8	6.7	7.0	6.7	6.7	6.7	15.0
18-Feb	6.7	6.7	6.8	6.7	7.0	6.7	6.7	6.7	15.0
25-Feb	7.0	7.0	7.0	7.0	7.1	7.0	7.0	7.0	15.0
04-Mar	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	15.0
11-Mar	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	15.0
18-Mar	8.4	8.5	8.4	8.5	8.5	8.5	8.5	8.5	15.0
25-Mar	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	15.0
01-Apr	10.4	10.4	10.3	10.4	10.4	10.4	10.4	10.4	15.0
08-Apr	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	15.0
15-Apr	12.2	12.1	12.1	12.1	12.2	12.1	12.1	12.1	15.0
22-Apr	12.6	12.6	12.5	12.4	12.6	12.6	12.4	12.4	15.0
29-Apr	12.3	12.3	12.2	11.9	12.4	12.3	12.0	11.9	15.0
06-May	11.4	11.4	11.2	11.0	11.5	11.4	11.1	10.9	15.0
13-May	13.3	12.8	12.9	12.5	13.2	12.8	12.6	12.4	15.0
20-May	14.9	12.1	14.5	13.8	13.7	12.1	13.9	13.7	17.0
27-May	16.6	15.0	16.0	15.0	14.8	15.0	15.1	14.9	17.0
03-Jun	18.3	17.2	17.8	16.7	16.1	17.1	16.7	16.7	20.0
10-Jun	18.6	17.6	18.3	17.2	16.0	17.6	17.2	17.3	20.0
17-Jun	20.7	20.0	20.3	19.4	17.2	20.0	19.4	19.5	23.5
24-Jun	23.2	22.7	22.8	22.1	18.8	22.7	22.2	22.2	23.5
01-Jul	21.1	20.4	21.2	20.2	19.3	20.4	20.4	20.2	23.5
08-Jul	23.5	22.6	**23.7**	22.2	21.2	22.6	22.5	22.3	23.5
15-Jul	**25.5**	**24.5**	**25.8**	**24.0**	22.8	**24.5**	**24.4**	**24.1**	23.5
22-Jul	**24.8**	**23.8**	**25.2**	23.2	21.9	**23.8**	**23.7**	23.3	23.5
29-Jul	**25.9**	**24.9**	**26.2**	**24.3**	22.7	**24.9**	**24.8**	**24.3**	23.5
05-Aug	**25.9**	**25.0**	**26.1**	**24.4**	22.8	**25.0**	**24.9**	**24.4**	23.5
12-Aug	**25.2**	**24.4**	**25.3**	**23.8**	22.0	**24.4**	**24.3**	**23.7**	23.5
19-Aug	**24.6**	**23.9**	**24.8**	23.3	21.5	**23.9**	**23.8**	23.2	23.5
26-Aug	22.1	21.7	22.2	21.0	19.6	21.7	21.6	20.9	23.5
02-Sep	22.7	22.2	22.9	21.5	20.1	22.2	22.1	21.3	23.5
09-Sep	20.4	20.2	20.6	19.5	18.6	20.2	20.1	19.4	23.5
16-Sep	15.4	15.6	15.4	14.9	15.2	15.7	15.6	14.8	19.0
23-Sep	15.5	15.7	15.5	15.0	15.3	15.7	15.6	15.0	19.0
Non-Compliant	6	6	7	4	0	6	6	4	

a - based on Draft Standards of the Water Quality Control Plan of the Hoopa Valley Tribal Environmental Protection Agency, June 2000. NTE = Not to Exceed

Table G. Predicted water temperatures of the Trinity River at Weitchpec (RM 0.0) for a **DRY** year (1990).
SNTEMP utilized dam release water temperatures predicted by the BETTER model that used PROSIM 99 output.
Bolded values represent times that the draft Hoopa Valley Tribe water temperature objectives would not be met.

Date	Predicted Water Temperatures of the Trinity River at Weitchpec - 1990								HVTEPA[a] Criteria NTE
	Alternatives								
	State Permit	NO Action	% Inflow	TRFE	Max Flow	E. Cond.	Cum 400K	Cum. 600K	
01-Oct	15.5	15.4	15.7	14.9	15.6	15.2	15.6	15.1	19.0
08-Oct	16.9	16.7	17.2	16.2	17.0	16.6	16.7	16.4	19.0
15-Oct	14.4	14.1	14.6	14.2	14.5	14.1	14.5	14.4	19.0
22-Oct	11.6	11.5	11.7	11.6	11.8	11.4	11.8	11.8	19.0
29-Oct	10.4	10.3	10.5	10.4	10.5	10.3	10.6	10.6	19.0
05-Nov	10.9	10.8	11.1	11.0	11.0	10.8	11.2	11.1	15.0
12-Nov	9.3	9.3	9.3	9.5	9.4	9.3	9.6	9.6	15.0
19-Nov	9.3	9.3	9.2	9.5	9.4	9.3	9.6	9.6	15.0
26-Nov	6.1	6.2	6.1	6.3	6.3	6.2	6.5	6.4	15.0
03-Dec	7.9	7.9	7.9	8.1	8.0	7.9	8.2	8.1	15.0
10-Dec	5.4	5.4	5.4	5.6	5.5	5.4	5.7	5.7	15.0
17-Dec	6.0	6.0	6.0	6.2	6.1	6.0	6.2	6.2	15.0
24-Dec	5.2	5.3	5.3	5.5	5.4	5.3	5.5	5.5	15.0
31-Dec	5.6	5.7	5.6	5.8	5.7	5.7	5.7	5.8	15.0
07-Jan	6.9	6.9	6.8	6.9	7.1	6.9	6.9	6.9	15.0
14-Jan	6.0	6.0	6.1	6.0	6.6	6.0	6.0	6.0	15.0
21-Jan	6.5	6.5	6.6	6.5	7.0	6.5	6.5	6.5	15.0
28-Jan	5.7	5.8	5.9	5.8	6.3	5.8	5.8	5.8	15.0
04-Feb	5.9	5.9	5.9	5.9	6.2	5.9	5.9	5.9	15.0
11-Feb	6.0	6.0	6.1	6.0	6.4	6.0	6.0	6.0	15.0
18-Feb	8.7	8.6	8.2	8.6	7.6	8.6	8.6	8.6	15.0
25-Feb	10.6	10.4	10.1	10.4	9.3	10.4	10.4	10.4	15.0
04-Mar	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	15.0
11-Mar	8.6	8.6	8.6	8.6	8.2	8.6	8.6	8.6	15.0
18-Mar	11.3	11.2	11.0	11.2	10.4	11.2	11.2	11.2	15.0
25-Mar	11.0	10.9	10.9	10.9	10.4	10.9	10.9	10.9	15.0
01-Apr	12.2	12.1	11.9	12.1	11.5	12.1	12.1	12.1	15.0
08-Apr	13.0	13.0	12.5	13.0	12.0	13.0	13.0	13.0	15.0
15-Apr	14.7	14.5	13.6	14.6	12.6	14.5	14.6	14.6	15.0
22-Apr	13.7	13.6	12.7	13.5	11.6	13.6	13.4	13.4	15.0
29-Apr	14.4	14.2	13.2	11.4	11.4	14.2	11.2	11.4	15.0
06-May	**15.5**	**15.3**	13.9	11.8	12.9	**15.3**	11.5	11.9	15.0
13-May	**15.7**	14.5	14.0	12.3	13.0	14.5	12.1	12.4	15.0
20-May	15.6	10.7	13.8	12.6	12.8	10.7	12.5	12.7	17.0
27-May	16.8	13.7	14.5	13.5	13.1	13.7	13.4	13.6	17.0
03-Jun	18.4	16.6	16.3	16.1	14.9	16.6	16.0	16.2	20.0
10-Jun	18.7	17.3	17.1	16.9	15.0	17.3	16.9	17.1	20.0
17-Jun	21.7	20.8	20.1	20.1	16.6	20.8	20.1	20.2	23.5
24-Jun	21.9	21.4	21.0	20.8	16.9	21.4	20.9	20.9	23.5
01-Jul	20.9	19.9	20.6	20.0	16.5	19.9	20.1	20.0	23.5
08-Jul	**24.2**	23.1	**24.2**	23.1	19.4	23.1	23.4	23.1	23.5
15-Jul	**26.1**	**24.7**	**26.1**	**24.7**	22.3	**24.7**	**25.1**	**24.8**	23.5
22-Jul	**24.0**	22.7	**24.1**	22.7	22.2	22.7	23.2	22.8	23.5
29-Jul	**25.0**	**23.6**	**25.1**	**23.6**	23.2	**23.6**	**24.1**	**23.7**	23.5
05-Aug	**24.4**	22.9	**24.4**	23.0	22.6	23.0	23.5	23.0	23.5
12-Aug	23.3	21.9	23.3	21.9	21.6	21.9	22.5	21.9	23.5
19-Aug	21.7	20.3	21.8	20.2	20.1	20.2	20.9	20.3	23.5
26-Aug	20.3	19.1	20.4	19.0	19.0	18.9	19.7	19.0	23.5
02-Sep	20.3	19.2	20.3	19.0	19.0	19.0	19.7	19.1	23.5
09-Sep	20.3	19.2	20.4	18.9	18.9	18.9	19.7	19.0	23.5
16-Sep	18.5	17.8	18.5	17.4	18.4	17.3	18.1	17.5	19.0
23-Sep	**20.3**	**19.5**	**19.8**	**19.1**	**20.2**	**19.0**	**19.8**	**19.2**	19.0
Non-Compliant	8	4	6	3	1	4	3	3	

a - based on Draft Standards of the Water Quality Control Plan of the Hoopa Valley Tribal Environmental Protection Agency, June 2000. NTE = Not to Exceed

Table H. Predicted water temperatures of the Trinity River at Weitchpec (RM 0.0) for a **NORMAL** year (1989).
SNTEMP utilized dam release water temperatures predicted by the BETTER model that used PROSIM 99 output.
Bolded values represent times that the draft Hoopa Valley Tribe water temperature objectives would not be met.

	Predicted Water Temperatures of the Trinity River at Weitchpec - 1989								HVTEPA[a]
	Alternatives								Criteria
Date	**State Permit**	**NO Action**	**% Inflow**	**TRFE**	**Max Flow**	**E. Cond.**	**Cum 400K**	**Cum. 600K**	**NTE**
01-Oct	15.5	15.3	15.8	15.0	15.5	15.3	15.4	15.2	19.0
08-Oct	14.4	14.3	14.7	14.1	14.5	14.3	14.5	14.4	19.0
15-Oct	11.5	11.6	11.6	11.6	11.7	11.6	11.9	11.8	19.0
22-Oct	9.8	9.8	9.8	9.8	9.9	9.8	10.0	9.9	19.0
29-Oct	8.5	8.6	8.5	8.6	8.6	8.6	8.8	8.7	19.0
05-Nov	6.3	6.5	6.2	6.5	6.4	6.5	6.7	6.6	13.0
12-Nov	5.4	5.5	5.2	5.5	5.5	5.5	5.7	5.7	13.0
19-Nov	4.0	4.2	4.1	4.2	4.1	4.2	4.3	4.3	13.0
26-Nov	4.0	4.1	4.0	4.1	4.1	4.1	4.2	4.2	13.0
03-Dec	3.9	4.1	3.9	4.0	4.0	4.1	4.1	4.1	13.0
10-Dec	4.6	4.9	4.9	4.8	4.7	4.9	4.9	4.9	13.0
17-Dec	2.4	2.7	2.8	2.7	2.6	2.7	2.7	2.7	13.0
24-Dec	0.9	1.1	1.0	1.2	1.1	1.1	1.1	1.2	13.0
31-Dec	2.6	2.8	2.7	2.8	2.7	2.8	2.7	2.8	13.0
07-Jan	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	13.0
14-Jan	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	13.0
21-Jan	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	13.0
28-Jan	6.4	6.4	6.4	6.4	6.6	6.4	6.4	6.4	13.0
04-Feb	4.4	4.4	4.4	4.4	4.9	4.4	4.4	4.4	13.0
11-Feb	5.5	5.5	5.5	5.5	5.9	5.5	5.5	5.5	13.0
18-Feb	6.5	6.5	6.6	6.5	6.7	6.5	6.5	6.5	13.0
25-Feb	6.9	6.9	6.9	6.9	7.0	6.9	6.9	6.9	13.0
04-Mar	6.5	6.5	6.6	6.5	6.6	6.5	6.5	6.5	13.0
11-Mar	8.4	8.4	8.3	8.4	8.1	8.4	8.4	8.4	13.0
18-Mar	8.6	8.6	8.4	8.6	8.2	8.6	8.6	8.6	13.0
25-Mar	9.4	9.3	9.1	9.3	8.6	9.3	9.3	9.3	13.0
01-Apr	11.0	10.9	10.4	11.0	9.7	10.9	10.9	10.9	13.0
08-Apr	**14.1**	**14.0**	12.9	**14.0**	11.6	**14.0**	**14.0**	**14.0**	13.0
15-Apr	**15.8**	**15.6**	**13.9**	**15.6**	12.4	**15.6**	**15.6**	**15.6**	13.0
22-Apr	13.0	12.9	11.4	12.7	10.5	12.9	12.8	12.7	13.0
29-Apr	**16.6**	**16.4**	**14.0**	**13.2**	11.4	**16.4**	13.0	13.0	13.0
06-May	**18.0**	**17.6**	**15.0**	10.8	10.9	**17.6**	10.5	10.8	13.0
13-May	**19.4**	**17.3**	**15.7**	11.4	12.2	**17.3**	11.0	11.3	13.0
20-May	**15.9**	11.6	14.4	12.1	13.1	11.6	12.0	12.0	15.0
27-May	14.4	13.8	14.0	13.2	13.5	13.8	13.2	13.2	15.0
03-Jun	**17.7**	**17.1**	16.8	15.8	16.3	**17.1**	15.8	15.8	17.0
10-Jun	**19.7**	**18.9**	**18.2**	16.7	17.0	**18.9**	16.8	16.7	17.0
17-Jun	**21.0**	**20.5**	**19.6**	16.9	**17.3**	**20.5**	**17.1**	16.9	17.0
24-Jun	**21.4**	**21.1**	**20.6**	16.7	**17.2**	**21.1**	**17.1**	16.8	17.0
01-Jul	**21.9**	**20.9**	**21.4**	16.2	16.9	**20.9**	**17.2**	16.5	17.0
08-Jul	**24.0**	**22.8**	**23.7**	18.3	19.3	**22.8**	19.4	18.5	22.1
15-Jul	**24.9**	**23.6**	**24.9**	**22.3**	20.9	**23.6**	**22.8**	**22.4**	22.1
22-Jul	**24.3**	**22.9**	**24.3**	**22.9**	21.7	**22.9**	**23.3**	**23.0**	22.1
29-Jul	**23.8**	**22.4**	**23.8**	**22.4**	22.0	**22.4**	**22.8**	**22.5**	22.1
05-Aug	**24.9**	**23.4**	**25.0**	**23.4**	**22.9**	**23.4**	**23.8**	**23.5**	22.1
12-Aug	**23.9**	**22.3**	**24.0**	**22.4**	21.9	**22.3**	**22.8**	**22.5**	22.1
19-Aug	**22.7**	21.3	**22.8**	21.3	20.9	21.3	21.8	21.4	22.1
26-Aug	21.7	20.4	21.9	20.4	20.0	20.4	20.9	20.5	22.1
02-Sep	21.2	19.9	21.4	19.8	19.4	19.9	20.3	20.0	22.1
09-Sep	20.4	19.0	20.5	19.0	18.7	19.0	19.5	19.2	22.1
16-Sep	16.3	15.4	16.4	15.3	16.1	15.4	15.9	15.6	19.0
23-Sep	16.3	15.4	16.5	15.5	16.2	15.4	15.9	15.7	19.0
Non-Compliant	18	16	15	8	3	16	10	7	

a - based on Draft Standards of the Water Quality Control Plan of the Hoopa Valley Tribal Environmental Protection Agency, June 2000. NTE = Not to Exceed

Table I. Predicted water temperatures of the Trinity River at Weitchpec (RM 0.0) for a **WET** year (1986).
SNTEMP utilized dam release water temperatures predicted by the BETTER model that used PROSIM 99 output.
Bolded values represent times that the draft Hoopa Valley Tribe water temperature objectives would not be met.

Date	Predicted Water Temperatures of the Trinity River at Weitchpec - 1986								HVTEPA[a] Criteria NTE
	Alternatives								
	State Permit	NO Action	% Inflow	TRFE	Max Flow	E. Cond.	Cum 400K	Cum. 600K	
01-Oct	15.4	15.2	15.7	14.8	15.4	15.1	14.9	14.9	19.0
08-Oct	12.2	12.1	12.5	11.9	12.4	12.0	12.0	12.1	19.0
15-Oct	10.4	10.4	10.6	10.4	10.6	10.3	10.5	10.5	19.0
22-Oct	8.9	8.9	9.0	8.9	9.1	8.9	9.0	9.1	19.0
29-Oct	8.2	8.3	8.3	8.3	8.4	8.2	8.3	8.4	19.0
05-Nov	6.6	6.8	6.6	6.7	6.8	6.7	6.8	6.9	13.0
12-Nov	4.1	4.3	4.0	4.2	4.3	4.3	4.3	4.4	13.0
19-Nov	3.3	3.4	3.5	3.3	3.4	3.4	3.4	3.5	13.0
26-Nov	3.3	3.4	3.3	3.3	3.4	3.4	3.4	3.4	13.0
03-Dec	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	13.0
10-Dec	2.8	3.0	3.1	2.9	2.9	3.0	3.0	3.0	13.0
17-Dec	3.1	3.3	3.3	3.2	3.2	3.3	3.3	3.3	13.0
24-Dec	3.2	3.3	3.2	3.3	3.2	3.3	3.3	3.3	13.0
31-Dec	5.3	5.4	5.3	5.3	5.3	5.4	5.4	5.4	13.0
07-Jan	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	13.0
14-Jan	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	13.0
21-Jan	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	13.0
28-Jan	5.7	5.7	5.7	5.7	5.9	5.7	5.7	5.7	13.0
04-Feb	5.6	5.7	5.7	5.6	5.9	5.6	5.6	5.6	13.0
11-Feb	5.6	5.6	5.6	5.6	5.8	5.6	5.6	5.6	13.0
18-Feb	6.5	6.5	6.5	6.5	6.6	6.5	6.5	6.5	13.0
25-Feb	8.3	8.3	8.3	8.3	8.4	8.3	8.3	8.3	13.0
04-Mar	7.1	7.1	7.3	7.1	7.3	7.1	7.1	7.1	13.0
11-Mar	6.9	6.9	6.9	6.9	7.0	6.9	6.9	6.9	13.0
18-Mar	8.7	8.7	8.7	8.7	8.6	8.7	8.7	8.7	13.0
25-Mar	10.0	10.0	10.0	10.0	9.7	10.0	10.0	10.0	13.0
01-Apr	10.5	10.5	10.3	10.5	9.9	10.5	10.5	10.5	13.0
08-Apr	11.5	11.4	11.0	11.4	10.3	11.4	11.4	11.4	13.0
15-Apr	11.6	11.5	11.0	11.5	10.1	11.5	11.5	11.5	13.0
22-Apr	12.8	12.7	11.9	12.7	10.5	12.8	12.6	12.7	13.0
29-Apr	11.6	11.6	10.6	10.9	9.6	11.6	10.7	10.8	13.0
06-May	**13.7**	**13.5**	11.9	11.6	10.3	**13.5**	11.6	11.6	13.0
13-May	**16.1**	**14.8**	**13.1**	11.2	10.9	**14.8**	11.2	11.2	13.0
20-May	**18.4**	12.0	13.6	10.9	11.1	12.0	10.9	10.9	15.0
27-May	**22.2**	**18.0**	**16.0**	13.1	14.1	**18.0**	13.0	13.0	15.0
03-Jun	**20.8**	**18.4**	15.7	14.0	13.9	**18.4**	13.9	13.9	17.0
10-Jun	**22.6**	**20.6**	**17.5**	16.3	15.7	**20.6**	16.1	16.2	17.0
17-Jun	**22.1**	**21.0**	**17.7**	15.8	15.5	**21.0**	15.6	15.7	17.0
24-Jun	**23.9**	**23.3**	**20.0**	16.6	**17.1**	**23.3**	16.5	16.5	17.0
01-Jul	**24.3**	**22.8**	**21.9**	16.3	**17.5**	**22.8**	16.5	16.5	17.0
08-Jul	**24.6**	**23.4**	**23.6**	17.6	17.6	**23.4**	17.8	17.8	22.1
15-Jul	**24.9**	**23.7**	**24.6**	21.9	18.1	**23.7**	22.0	22.0	22.1
22-Jul	**25.2**	**24.1**	**25.2**	**24.1**	21.6	**24.1**	**24.2**	**24.2**	22.1
29-Jul	**25.0**	**23.4**	**25.0**	**23.4**	21.6	**23.4**	**23.5**	**23.5**	22.1
05-Aug	**25.2**	**23.8**	**25.3**	**23.9**	**22.3**	**23.8**	**24.1**	**24.0**	22.1
12-Aug	**24.3**	**22.9**	**24.2**	**23.0**	21.9	**22.9**	**23.2**	**23.1**	22.1
19-Aug	22.1	20.8	22.1	20.8	20.4	20.8	21.1	20.9	22.1
26-Aug	20.5	19.0	20.4	19.0	18.7	19.0	19.3	19.1	22.1
02-Sep	**23.0**	21.3	23.2	21.2	20.7	21.3	21.5	21.3	22.1
09-Sep	17.4	16.5	17.5	16.3	16.3	16.5	16.6	16.4	22.1
16-Sep	13.6	13.0	13.7	12.7	13.6	13.0	13.1	12.9	19.0
23-Sep	13.1	12.5	13.2	12.4	13.1	12.5	12.6	12.5	19.0
Non-Compliant	16	14	12	4	3	14	4	4	

a - based on Draft Standards of the Water Quality Control Plan of the Hoopa Valley Tribal Environmental Protection Agency, June 2000. NTE = Not to Exceed

Table J. Predicted water temperatures of the Trinity River at Weitchpec (RM 0.0) for an **EXTREMELY WET** year (1983).
SNTEMP utilized dam release water temperatures predicted by the BETTER model that used PROSIM 99 output.
Bolded values represent times that the draft Hoopa Valley Tribe water temperature objectives would not be met.

	Predicted Water Temperatures of the Trinity River at Weitchpec - 1983								HVTEPA[a]
	Alternatives								Criteria
Date	State Permit	NO Action	% Inflow	TRFE	Max Flow	E. Cond.	Cum 400K	Cum. 600K	NTE
01-Oct	12.3	12.1	12.3	12.1	12.7	12.1	12.1	12.1	19.0
08-Oct	12.8	12.4	12.8	12.4	13.1	12.4	12.4	12.4	19.0
15-Oct	11.2	10.8	10.9	11.0	11.5	10.8	11.2	11.0	19.0
22-Oct	9.8	9.5	9.6	9.6	10.1	9.5	9.7	9.6	19.0
29-Oct	7.5	7.3	7.3	7.5	7.9	7.4	7.5	7.5	19.0
05-Nov	6.9	6.8	6.9	6.9	7.0	6.8	6.9	6.9	13.0
12-Nov	6.1	6.0	6.0	6.0	6.1	6.0	6.0	6.0	13.0
19-Nov	6.2	6.1	6.2	6.2	6.2	6.1	6.2	6.2	13.0
26-Nov	5.7	5.6	5.7	5.6	5.7	5.6	5.6	5.6	13.0
03-Dec	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	13.0
10-Dec	5.6	5.6	5.7	5.6	5.7	5.6	5.6	5.6	13.0
17-Dec	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	13.0
24-Dec	5.3	5.3	5.4	5.3	5.3	5.3	5.3	5.3	13.0
31-Dec	5.0	5.0	5.1	5.0	5.1	5.0	5.0	5.0	13.0
07-Jan	5.0	5.0	5.2	5.0	5.5	5.0	5.0	5.0	13.0
14-Jan	4.9	4.9	5.2	4.9	5.4	4.9	4.9	4.9	13.0
21-Jan	5.3	5.4	5.6	5.4	5.7	5.4	5.4	5.4	13.0
28-Jan	5.5	5.5	5.8	5.5	5.8	5.5	5.5	5.5	13.0
04-Feb	4.6	4.7	5.1	4.7	5.3	4.7	4.7	4.7	13.0
11-Feb	6.0	6.0	6.1	6.0	6.1	6.0	6.0	6.0	13.0
18-Feb	6.5	6.5	6.6	6.5	6.6	6.5	6.5	6.5	13.0
25-Feb	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	13.0
04-Mar	7.5	7.4	7.4	7.4	7.4	7.4	7.4	7.4	13.0
11-Mar	7.5	7.4	7.5	7.4	7.5	7.4	7.4	7.4	13.0
18-Mar	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	13.0
25-Mar	7.9	7.8	7.9	7.8	7.9	7.8	7.8	7.8	13.0
01-Apr	10.3	10.2	9.7	10.2	9.3	10.2	10.2	10.2	13.0
08-Apr	10.1	10.0	9.7	10.0	9.0	10.0	10.0	10.0	13.0
15-Apr	10.8	10.8	10.4	10.8	9.3	10.8	10.8	10.8	13.0
22-Apr	10.5	10.5	10.0	10.4	8.7	10.5	10.4	10.4	13.0
29-Apr	10.6	10.9	10.7	11.1	9.5	10.9	11.1	11.1	13.0
06-May	10.4	10.8	10.7	11.1	9.7	10.8	11.1	11.1	13.0
13-May	11.9	12.2	12.2	13.0	10.7	12.2	13.0	13.0	13.0
20-May	**13.1**	11.8	**13.5**	11.6	10.3	11.8	11.6	11.6	13.0
27-May	12.6	12.7	12.5	10.7	12.7	12.7	10.7	10.7	15.0
03-Jun	12.3	12.3	12.0	11.6	14.1	12.3	11.6	11.6	15.0
10-Jun	11.7	11.8	11.7	11.6	14.3	11.8	11.6	11.6	17.0
17-Jun	12.2	12.4	12.5	13.0	16.1	12.4	13.0	13.0	17.0
24-Jun	12.4	12.6	12.9	14.3	**17.1**	12.6	14.3	14.3	17.0
01-Jul	13.7	13.8	13.3	13.0	**17.9**	13.8	13.0	13.0	17.0
08-Jul	13.9	14.0	13.8	13.5	**18.3**	14.0	13.6	13.5	17.0
15-Jul	13.4	13.5	13.6	13.9	18.1	13.5	13.9	13.9	22.1
22-Jul	13.9	14.0	14.3	14.7	19.9	14.0	14.7	14.7	22.1
29-Jul	17.7	17.3	17.8	18.1	22.6	17.3	18.1	18.1	22.1
05-Aug	**23.4**	22.1	**22.8**	22.1	**22.9**	22.1	22.1	22.1	22.1
12-Aug	**22.7**	21.4	**22.4**	21.4	**22.2**	21.4	21.4	21.4	22.1
19-Aug	18.6	17.6	18.5	17.6	18.5	17.6	17.6	17.6	22.1
26-Aug	18.2	17.2	18.1	17.2	18.1	17.2	17.2	17.2	22.1
02-Sep	19.6	18.5	19.6	18.5	19.3	18.5	18.4	18.5	22.1
09-Sep	19.2	18.1	19.2	18.1	19.1	18.1	18.1	18.1	22.1
16-Sep	17.9	16.9	17.8	16.9	17.8	16.9	16.9	16.9	19.0
23-Sep	15.6	15.0	15.7	15.0	15.8	15.0	15.0	15.0	19.0
Non-Compliant	3	0	3	0	5	0	0	0	

a - based on Draft Standards of the Water Quality Control Plan of the Hoopa Valley Tribal Environmental Protection Agency, June 2000. NTE = Not to Exceed

Old River @ Rock Slough (106)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	225	221	199	313	520	513	430	379	377	337	456	479	4,449
1977	561	675	661	623	1072	789	557	506	521	594	681	790	8,230
1978	782	679	519	320	283	357	341	245	210	207	223	270	4,436
1979	309	492	488	411	320	264	222	212	212	205	255	341	3,731
1980	448	464	315	234	238	238	219	234	214	205	214	278	3,301
1981	342	429	344	246	253	225	223	240	273	315	377	438	3,705
1982	498	506	225	262	229	287	209	215	211	192	187	189	3,210
1983	197	241	261	258	191	195	180	180	202	218	205	206	2,534
1984	205	210	189	204	257	232	204	211	230	206	222	287	2,657
1985	445	523	229	258	474	315	256	277	256	299	375	447	4,154
1986	500	511	400	415	339	249	217	234	236	243	226	297	3,867
1987	457	620	590	840	836	421	291	271	282	315	413	518	5,854
1988	493	443	384	462	325	276	356	422	400	334	526	685	5,106
1989	654	564	506	753	930	401	208	211	257	297	384	450	5,617
1990	479	628	620	1096	965	447	375	356	307	318	488	642	6,721
76 - 90 AVG	440	480	395	460	482	347	286	280	279	286	349	421	4,505

Old River @ Rock Slough (106)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	99	74	65	196	434	431	324	258	254	227	384	417	3,161
1977	472	584	583	806	1104	764	472	390	413	513	635	780	7,516
1978	736	555	410	154	95	125	116	78	69	76	101	143	2,658
1979	193	403	410	282	126	87	69	74	84	76	143	250	2,197
1980	371	387	213	85	71	67	63	76	74	74	92	154	1,727
1981	227	320	239	104	83	67	70	91	151	214	291	368	2,225
1982	420	434	102	92	71	94	49	59	65	59	62	61	1,568
1983	61	88	96	65	49	52	41	40	56	67	63	65	763
1984	68	56	53	50	76	69	59	77	107	81	104	185	985
1985	373	455	105	134	381	184	112	143	132	194	288	378	2,879
1986	421	418	304	312	147	76	64	74	84	95	99	191	2,285
1987	376	550	538	839	816	307	140	118	159	213	333	463	4,852
1988	418	321	281	373	194	138	240	328	306	232	465	663	3,959
1989	596	466	427	728	922	297	78	85	144	193	298	384	4,618
1990	407	555	554	1147	973	340	268	255	199	216	422	612	5,948
76 - 90 AVG	349	378	292	359	369	207	144	143	153	169	252	341	3,156

Old River @ Rock Slough (106)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2653	2736	3043	3829	4224	4139	3871	3785	4096	3658	3294	2969	42,297
1977	3116	3234	3304	3797	4089	4212	4125	4209	4308	4391	4199	3721	46,705
1978	3614	3513	3706	5688	6109	7078	6347	4059	3280	3398	3353	3100	53,245
1979	2919	2816	3044	4694	6172	5352	3810	3201	3253	3330	3217	2979	44,787
1980	2810	2685	3117	4552	6791	6072	4366	3504	3261	3296	3239	3111	46,804
1981	2981	2927	3095	4077	4911	4607	3971	3618	3414	3162	3137	2921	42,821
1982	2898	2887	3440	5293	5543	6555	4893	4305	3345	3207	3085	2921	48,372
1983	2934	3841	5342	5913	6193	5067	4628	3527	4318	4139	3442	3191	52,535
1984	3128	3363	4213	4793	5639	4738	3368	3078	3299	3289	3163	2939	45,010
1985	2718	2954	3447	3731	4220	4486	3996	3582	3409	3165	3160	2947	41,815
1986	2942	2981	3374	4090	7424	6124	4365	3674	3486	3811	3500	3021	48,792
1987	2852	2882	3036	3553	4228	4474	4418	4038	3509	3213	3262	3041	42,506
1988	2971	3040	3253	3885	4389	4481	3792	3317	3443	3380	3480	3217	42,648
1989	3298	3171	3184	3764	4378	3964	3100	2918	3112	3115	3209	2917	40,130
1990	2835	2971	3212	3519	4098	4593	3559	3090	3285	3257	3361	3147	40,927
76 - 90 AVG	2,978	3,067	3,454	4,345	5,227	5,063	4,174	3,594	3,521	3,454	3,340	3,076	45,293

Old River @ Rock Slough (106)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	239	223	265	638	843	607	446	390	398	319	405	516	4,449
1977	621	739	738	948	1148	812	578	518	574	639	702	814	8,230
1978	836	728	498	318	357	369	258	217	206	216	226	316	4,438
1979	426	546	494	441	304	238	208	208	204	208	303	380	3,731
1980	434	426	282	317	385	217	187	218	215	209	219	315	3,301
1981	427	538	544	455	266	206	200	249	289	314	406	490	3,705
1982	533	492	221	292	256	316	225	201	202	190	195	195	3,210
1983	186	231	278	265	160	145	141	178	202	201	195	192	2,534
1984	190	284	209	201	230	206	199	214	219	212	248	304	2,657
1985	428	548	274	320	572	391	286	313	291	303	399	514	4,154
1986	532	508	401	420	594	297	186	217	234	228	219	284	3,867
1987	429	607	599	946	880	416	274	259	280	306	400	592	5,854
1988	677	540	461	512	370	289	347	385	405	335	502	713	5,106
1989	756	609	511	767	947	395	205	204	227	275	386	449	5,617
1990	497	651	664	1086	888	438	390	395	331	325	462	612	6,721
76 - 90 AVG	481	511	429	528	547	356	275	278	285	285	351	446	4,505

Old River @ Rock Slough (106)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	112	82	152	591	826	543	344	275	283	208	323	459	3,161
1977	529	651	672	954	1196	793	492	414	478	561	654	799	7,516
1978	773	589	385	152	133	135	79	64	67	81	105	191	2,658
1979	325	460	425	323	125	75	62	72	81	88	204	297	2,197
1980	354	341	173	124	141	66	50	69	74	77	98	197	1,727
1981	332	454	486	369	130	65	61	118	173	210	324	428	2,225
1982	460	414	96	107	83	108	62	53	60	59	71	66	1,568
1983	55	80	102	91	50	53	42	42	58	60	58	57	763
1984	60	97	57	54	66	57	56	73	92	91	137	205	985
1985	354	480	156	210	501	271	146	200	182	198	315	456	2,879
1986	452	408	305	318	286	110	57	68	82	86	97	179	2,285
1987	341	528	549	969	870	302	127	112	158	198	313	544	4,862
1988	616	423	374	434	236	142	220	272	296	226	435	694	3,959
1989	724	530	434	745	941	290	75	74	106	166	302	380	4,618
1990	429	585	602	1134	883	332	288	305	231	225	391	573	5,948
76 - 90 AVG	394	408	331	438	431	223	144	147	161	169	255	368	3,156

Old River @ Rock Slough (106)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2659	2674	2970	3723	4150	4158	3843	3686	4086	3572	3302	3025	42,297
1977	3123	3203	3322	3811	4073	4202	4232	4073	4321	4532	4384	3895	46,705
1978	3916	3661	3694	5675	7072	6664	4987	3731	3305	3571	3250	3094	53,245
1979	3073	2888	2994	4522	5786	4855	3632	3190	3009	3024	3029	2869	44,787
1980	2765	2676	3120	4494	7952	5619	3874	3387	3278	3365	3232	3101	48,804
1981	2976	2907	3031	3700	4154	3982	3415	3337	3391	3268	3270	2991	42,821
1982	2928	2893	3443	5270	5460	6829	5259	4111	3376	3212	3100	2930	48,372
1983	2740	3421	5271	6146	6242	5128	4665	3600	4340	4031	3415	3085	52,535
1984	2958	3373	4265	4914	5371	4396	3341	3218	3206	3092	3043	2888	45,010
1985	2699	2960	3420	3654	4099	4638	3987	3241	3220	3193	3329	3096	41,815
1986	3055	3025	3366	4063	9091	6640	4362	3680	3528	3669	3237	2902	48,792
1987	2827	2884	3026	3484	4175	4478	4153	3811	3506	3360	3509	3315	42,506
1988	3344	3203	3249	3875	4737	4769	4019	3604	3817	3576	3539	3289	42,648
1989	3321	3115	3141	3737	4394	3977	3081	3010	3129	3093	3190	2928	40,130
1990	2842	2950	3210	3517	4045	4508	3475	2972	3157	3186	3307	3157	40,927
76 - 90 AVG	3,015	3,056	3,435	4,306	5,320	4,990	4,022	3,510	3,511	3,450	3,342	3,104	45,293

Old River @ Rock Slough (106)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	226	214	261	634	834	599	439	388	378	307	395	533	5,208
1977	630	804	778	887	1068	811	570	509	562	629	698	817	8,763
1978	831	703	538	323	341	332	255	227	210	211	222	303	4,496
1979	433	549	481	427	295	234	210	211	203	206	304	382	3,935
1980	429	404	266	226	350	230	202	227	216	208	222	319	3,299
1981	422	476	465	429	258	209	202	254	291	311	404	479	4,200
1982	512	463	215	261	227	301	223	210	212	192	194	192	3,202
1983	181	211	258	261	193	198	181	182	203	214	204	195	2,481
1984	191	207	192	211	243	215	204	217	220	212	248	306	2,666
1985	432	523	264	295	531	381	277	294	266	295	404	520	4,482
1986	531	526	398	407	416	288	221	237	240	238	222	286	4,010
1987	425	596	592	934	868	412	271	256	281	307	404	595	5,941
1988	706	612	525	525	369	288	350	395	384	308	447	642	5,551
1989	683	600	513	765	949	412	208	205	226	282	413	494	5,750
1990	494	644	654	1063	843	417	367	360	313	322	445	615	6,537
76 - 90 AVG	475	502	427	510	519	355	279	278	280	283	348	445	4,701

Old River @ Rock Slough (106)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	100	76	148	587	815	534	338	276	268	199	311	480	4,132
1977	561	751	725	877	1095	790	486	409	468	553	651	803	8,169
1978	776	584	441	159	125	116	78	69	69	77	102	183	2,779
1979	334	468	409	309	120	73	63	74	79	84	204	300	2,517
1980	350	315	154	74	125	69	56	73	75	76	102	204	1,673
1981	330	378	390	339	121	65	62	124	174	204	320	414	2,921
1982	434	380	89	91	69	102	56	56	65	60	71	64	1,537
1983	52	70	95	87	50	53	42	42	58	65	62	59	735
1984	60	56	55	54	70	62	59	75	93	91	137	206	1,018
1985	360	454	145	179	451	260	139	174	150	189	320	462	3,283
1986	453	434	304	303	194	96	66	75	85	91	99	180	2,380
1987	337	520	542	954	855	296	124	111	180	201	318	548	4,986
1988	656	523	456	450	233	140	227	287	282	203	371	610	4,438
1989	639	524	440	743	948	312	78	74	104	174	332	435	4,803
1990	428	583	597	1106	827	305	260	260	209	222	371	577	5,745
76 - 90 AVG	391	408	333	421	407	218	142	145	156	166	251	368	3,406

Old River @ Rock Slough (106)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2655	2674	2968	3718	4146	4159	3760	3593	3859	3420	3284	3051	41,287
1977	3078	3121	3284	3895	4199	4225	4128	3953	4241	4459	4354	3884	46,821
1978	3750	3520	3668	5659	7084	6677	4985	3730	3306	3450	3202	3091	52,122
1979	3026	2863	3006	4537	5787	4851	3633	3166	3002	3054	3046	2868	42,839
1980	2725	2659	3118	4490	7947	5742	3905	3398	3278	3336	3222	3104	46,924
1981	2897	2881	3037	3698	4148	4141	3486	3331	3410	3356	3357	3013	40,755
1982	2937	2893	3439	5270	5474	6748	5095	4100	3371	3212	3100	2925	48,564
1983	2736	3421	5293	5920	6208	5126	4664	3600	4341	4031	3415	3084	51,839
1984	2956	3373	4265	4914	5370	4403	3348	3222	3208	3091	3043	2888	44,081
1985	2654	2939	3417	3713	4151	4553	3915	3335	3271	3207	3348	3078	41,581
1986	3025	3011	3361	4064	8096	6641	4442	3713	3529	3768	3277	2905	49,832
1987	2827	2881	3025	3485	4176	4478	4111	3748	3479	3330	3485	3296	42,321
1988	3259	3122	3221	3863	4768	4786	3932	3532	3523	3304	3440	3262	44,012
1989	3261	3080	3136	3734	4297	3920	3081	3025	3163	3125	3280	2967	40,069
1990	2827	2908	3191	3519	4072	4543	3540	3066	3145	3122	3299	3154	40,386
76 - 90 AVG	2,974	3,023	3,429	4,299	5,328	5,000	4,002	3,501	3,475	3,418	3,343	3,105	44,896

Old River @ Rock Slough (106)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeters

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	225	214	258	608	825	602	443	383	388	317	406	531	5,200
1977	611	723	738	943	1132	803	563	511	570	639	706	819	8,758
1978	838	718	495	318	340	332	256	227	210	229	229	304	4,496
1979	428	539	495	450	300	233	210	213	205	210	306	380	3,969
1980	435	430	284	228	351	225	201	226	216	226	226	307	3,355
1981	446	600	589	543	308	215	202	247	282	311	403	474	4,620
1982	504	481	220	261	226	304	234	210	212	195	200	197	3,244
1983	182	211	265	272	194	198	181	182	203	214	204	195	2,501
1984	191	207	192	211	243	215	204	217	220	212	248	305	2,665
1985	431	571	250	302	575	390	286	306	281	305	417	526	4,640
1986	538	518	405	398	406	288	219	235	240	232	220	285	3,984
1987	423	594	592	935	868	412	287	274	280	300	390	574	5,929
1988	644	506	418	482	360	286	341	371	396	334	495	708	5,341
1989	755	614	512	761	936	392	204	204	226	275	388	450	5,717
1990	495	644	648	1074	883	439	387	387	322	321	492	669	6,761
76 - 90 AVG	476	505	424	519	530	358	281	280	283	288	355	448	4,745

Old River @ Rock Slough (106)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	99	76	144	553	803	538	340	265	266	205	324	476	4,089
1977	532	644	671	946	1176	782	481	411	476	563	660	805	8,147
1978	778	585	385	153	124	115	78	69	70	89	107	184	2,737
1979	325	454	429	337	126	73	63	74	81	89	207	297	2,555
1980	354	346	176	77	125	66	56	73	75	87	102	189	1,726
1981	356	531	541	477	182	75	62	112	162	206	321	410	3,435
1982	427	403	95	91	69	104	62	56	65	62	77	71	1,582
1983	53	70	101	93	50	53	42	42	58	65	62	59	748
1984	60	56	55	54	70	62	59	75	93	91	138	205	1,018
1985	356	510	129	189	504	268	148	190	170	200	336	468	3,468
1986	458	421	311	293	182	95	65	75	85	88	99	179	2,351
1987	335	518	542	955	856	297	135	118	150	186	298	521	4,913
1988	567	367	320	397	220	137	208	249	280	223	426	688	4,082
1989	720	535	437	738	928	285	74	74	105	167	304	381	4,748
1990	427	576	586	1120	876	334	285	294	217	219	427	642	6,003
76 - 91 AVG	390	406	328	432	419	219	144	145	157	169	259	372	3,440

Old River @ Rock Slough (106)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2655	2674	2976	3755	4177	4163	3844	3725	4164	3589	3314	3044	42,080
1977	3132	3206	3327	3823	4084	4205	4086	3964	4278	4505	4373	3892	46,875
1978	3916	3662	3694	5675	7067	6666	4986	3733	3313	3685	3280	3095	52,772
1979	3073	2889	2987	4533	5810	4844	3619	3186	3010	3024	3029	2869	42,873
1980	2770	2680	3121	4495	7945	5618	3873	3388	3278	3547	3295	3097	47,107
1981	2950	2885	3024	3619	4099	4036	3452	3423	3431	3272	3269	2978	40,438
1982	2910	2883	3443	5271	5460	6829	5258	4107	3384	3258	3125	2938	48,866
1983	2744	3424	5357	6201	6242	5128	4664	3600	4341	4031	3415	3084	52,231
1984	2956	3373	4265	4914	5371	4400	3345	3219	3206	3091	3043	2888	44,071
1985	2708	2968	3481	3637	4097	4650	3993	3266	3236	3220	3367	3107	41,730
1986	3066	3041	3370	4041	8076	6639	4361	3680	3535	3697	3248	2903	49,657
1987	2827	2883	3026	3485	4177	4481	4405	4145	3685	3479	3637	3379	43,609
1988	3422	3294	3274	3877	4785	4806	4143	3738	3933	3643	3584	3308	45,807
1989	3348	3145	3152	3742	4406	3983	3082	3010	3130	3093	3190	2929	40,210
1990	2846	2960	3217	3521	4035	4492	3473	3018	3244	3234	3359	3188	40,587
76 - 91 AVG	3,022	3,064	3,448	4,306	5,322	4,996	4,039	3,547	3,545	3,491	3,369	3,113	45,261

Old River @ Rock Slough (106)													
Flow Study													
Electrical Conductivity													
Units are in microsiemens/centimeter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	244	217	263	632	833	599	444	385	402	322	417	539	5,297
1977	569	620	572	713	1021	773	566	509	559	630	700	821	8,053
1978	849	730	526	323	330	327	255	227	211	229	229	308	4,544
1979	432	544	497	450	300	232	208	212	205	206	299	376	3,961
1980	441	439	286	229	351	225	201	226	216	221	222	308	3,365
1981	451	607	591	551	316	216	202	247	289	302	377	445	4,594
1982	500	465	216	261	226	304	233	210	212	196	199	197	3,219
1983	182	211	265	261	192	198	181	182	203	214	204	195	2,488
1984	191	207	192	211	243	215	204	217	220	213	248	304	2,665
1985	428	565	250	299	568	390	286	297	266	289	394	502	4,534
1986	511	456	374	421	423	289	220	236	240	239	221	287	3,917
1987	429	597	592	934	868	412	302	294	284	300	388	583	5,983
1988	649	502	489	525	376	295	322	357	368	313	468	675	5,339
1989	707	589	509	760	946	413	208	205	238	281	386	471	5,713
1990	489	642	646	1054	859	423	343	309	304	306	417	560	6,352
76 - 90 AVG	471	493	418	508	523	354	278	274	281	284	345	438	4,668

Old River @ Rock Slough (106)													
Flow Study													
Bromide													
Units are in micrograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	122	79	150	583	814	534	339	264	275	208	337	487	4,192
1977	472	503	476	675	1042	745	474	401	460	549	652	806	7,255
1978	790	598	418	158	120	113	78	69	70	89	106	189	2,800
1979	332	462	431	337	126	72	62	74	81	84	198	292	2,551
1980	361	357	177	78	125	66	56	73	75	85	99	190	1,742
1981	363	540	543	487	193	77	62	112	163	188	286	373	3,387
1982	420	383	91	91	69	105	62	56	65	62	75	70	1,549
1983	53	70	102	87	50	53	42	42	58	65	62	59	743
1984	60	56	55	54	71	62	59	75	93	92	138	205	1,020
1985	353	504	129	185	496	268	148	178	149	179	307	440	3,336
1986	429	352	274	320	202	96	65	75	65	92	98	182	2,270
1987	342	522	542	954	856	296	143	128	148	182	294	533	4,940
1988	583	388	413	449	240	138	170	217	243	201	396	649	4,087
1989	668	509	434	737	944	314	79	77	120	169	299	405	4,755
1990	421	577	587	1097	846	313	225	194	196	202	337	511	5,506
76 - 90 AVG	385	393	321	419	413	217	138	136	152	163	246	359	3,342

Old River @ Rock Slough (106)													
Flow Study													
Dissolved Organic Carbon													
Units are in micrograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2662	2675	2970	3724	4151	4158	3904	3806	4297	3644	3338	3050	42,379
1977	3196	3325	3311	3774	4082	4204	4272	4136	4349	4531	4383	3942	47,505
1978	3907	3671	3722	5690	6907	6606	4984	3733	3315	3688	3280	3095	52,598
1979	3045	2874	2986	4533	5811	4806	3592	3180	3009	3072	3056	2869	42,833
1980	2781	2685	3121	4495	7946	5617	3872	3384	3275	3488	3269	3092	47,025
1981	2933	2874	3019	3618	4106	4028	3444	3412	3630	3536	3390	3008	40,998
1982	2934	2893	3441	5270	5462	6841	5252	4109	3385	3274	3131	2938	48,930
1983	2751	3429	5308	5811	6193	5127	4664	3600	4341	4031	3415	3084	51,754
1984	2959	3373	4265	4914	5374	4397	3341	3218	3207	3091	3043	2888	44,070
1985	2694	2963	3483	3855	4111	4661	4003	3349	3314	3344	3424	3085	42,066
1986	3019	2978	3351	4073	8098	6639	4392	3694	3530	3782	3281	2905	49,742
1987	2827	2881	3025	3485	4176	4480	4579	4463	3826	3657	3635	3315	44,349
1988	3285	3117	3219	3865	4789	5097	4482	4055	3957	3500	3474	3252	46,092
1989	3265	3085	3141	3740	4299	3921	3082	2966	3162	3285	3416	2999	40,361
1990	2848	2931	3192	3514	4068	4542	3747	3194	3286	3210	3284	3114	40,930
76 - 90 AVG	3,007	3,050	3,437	4,277	5,305	5,008	4,107	3,620	3,592	3,542	3,388	3,109	45,443

Old River @ Rock Slough (106)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	303	260	297	771	909	599	454	390	384	334	464	645	5,840
1977	607	578	543	667	980	775	563	506	543	616	692	812	7,882
1978	835	715	513	323	343	333	256	227	211	229	225	303	4,513
1979	434	533	458	420	295	231	209	215	209	203	272	355	3,834
1980	449	471	311	231	351	227	203	229	218	236	227	308	3,461
1981	410	503	525	518	326	220	202	255	315	319	386	492	4,471
1982	520	468	217	262	227	309	220	213	213	201	206	203	3,259
1983	182	211	223	259	192	198	181	182	203	213	200	194	2,438
1984	169	208	192	211	243	215	204	217	220	212	250	302	2,663
1985	439	620	263	313	584	394	287	288	281	291	398	532	4,690
1986	545	494	389	424	424	289	220	236	240	245	225	286	4,017
1987	428	597	592	934	867	412	393	369	343	348	402	589	6,274
1988	683	550	385	466	369	324	328	363	390	338	484	706	5,386
1989	728	549	485	743	924	395	205	214	237	272	391	487	5,630
1990	492	643	649	1056	856	422	339	302	302	318	512	664	6,575
76 - 90 AVG	483	493	403	507	526	356	284	280	287	292	358	460	4,729

Old River @ Rock Slough (106)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	193	132	192	754	910	534	348	263	258	218	424	611	4,837
1977	514	451	434	614	991	744	475	400	440	533	643	797	7,036
1978	776	586	407	158	126	116	78	69	70	89	101	182	2,758
1979	331	442	378	300	120	72	62	76	84	79	165	264	2,373
1980	367	395	207	81	126	67	57	74	76	94	101	190	1,835
1981	308	405	461	446	202	80	63	115	167	192	293	429	3,161
1982	443	385	91	91	69	106	54	58	66	66	82	77	1,588
1983	54	70	77	87	50	53	42	42	58	65	59	58	715
1984	58	56	55	54	70	62	59	75	93	91	140	202	1,015
1985	362	568	145	203	516	272	145	152	141	170	310	474	3,458
1986	457	380	289	323	203	96	65	75	85	96	102	180	2,351
1987	341	522	542	953	854	296	187	165	175	205	290	524	5,054
1988	591	376	265	376	229	152	166	227	260	220	408	683	3,953
1989	687	458	404	716	913	289	75	76	100	154	303	425	4,600
1990	425	579	591	1098	843	312	216	174	183	213	450	660	5,744
76 - 90 AVG	394	387	303	417	415	217	139	136	150	166	258	384	3,365

Old River @ Rock Slough (106)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2694	2691	2971	3611	4024	4197	4012	3954	4202	3793	3584	3171	42,904
1977	3259	3333	3352	3839	4135	4334	4217	4081	4347	4527	4378	3895	47,697
1978	3857	3613	3889	5698	7125	6694	4966	3734	3321	3692	3344	3115	52,868
1979	3075	2926	3039	4548	5793	4804	3595	3219	3070	3140	3121	2954	43,284
1980	2841	2698	3124	4497	7947	5674	3910	3415	3302	3655	3369	3114	47,546
1981	3015	2963	3055	3687	4174	4069	3418	3823	4180	3901	3582	3079	42,746
1982	2947	2898	3445	5283	5474	6894	5044	4241	3396	3355	3208	2958	49,145
1983	2760	3435	4435	5767	6193	5123	4664	3600	4341	3979	3322	3051	50,670
1984	2913	3376	4265	4914	5371	4402	3345	3219	3206	3091	3043	2889	44,034
1985	2769	2999	3488	3643	4101	4694	4129	3743	3938	3673	3541	3158	43,876
1986	3174	3136	3397	4088	8113	6636	4408	3698	3530	3851	3306	2907	50,244
1987	2827	2880	3025	3485	4177	4489	4940	4860	4670	4403	4248	3782	47,786
1988	3892	3649	3365	3902	4846	5600	4726	3969	4159	3833	3780	3444	49,165
1989	3378	3118	3149	3758	4404	3985	3087	3325	3735	3540	3455	3008	41,942
1990	2843	2928	3196	3518	4069	4548	3870	3490	3473	3300	3408	3193	41,836
76 - 90 AVG	3,083	3,110	3,400	4,283	5,330	5,076	4,157	3,748	3,791	3,716	3,513	3,181	46,384

Old River at Rock Slough, 106
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	292	386	898	1078	903	578	417	363	375	371	442	451
1977	523	554	610	745	914	668	447	467	501	488	613	766
1978	805	687	521	320	304	316	270	267	223	201	251	320
1979	445	553	1129	906	324	229	239	311	218	205	294	378
1980	444	454	599	324	351	285	228	298	242	201	227	314
1981	462	622	1351	1142	439	235	223	267	300	328	365	436
1982	515	510	224	261	227	271	193	226	216	192	226	217
1983	191	211	216	357	207	194	184	181	217	216	191	190
1984	201	223	197	197	247	211	222	265	218	203	245	308
1985	438	591	297	335	572	372	284	287	258	274	369	469
1986	526	515	689	579	343	269	263	309	260	210	241	305
1987	425	604	1354	1436	888	407	448	375	341	339	395	580
1988	642	481	842	763	353	443	349	320	350	355	501	655
1989	617	492	455	702	921	424	216	205	223	273	391	487
1990	476	571	556	916	715	384	301	275	272	312	487	623
Average	467	497	663	671	514	352	286	294	281	278	349	433

Old River at Rock Slough, 106
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	189	293	921	1127	904	514	306	222	224	234	359	380
1977	407	421	484	687	900	608	337	354	413	405	560	750
1978	750	575	427	156	106	108	77	81	73	74	140	216
1979	350	477	1197	889	152	71	77	117	74	83	191	293
1980	363	376	556	190	129	95	67	107	85	70	112	202
1981	382	560	1464	1202	340	99	74	98	130	176	260	362
1982	438	438	101	91	69	87	42	61	67	62	109	102
1983	59	70	74	138	57	51	41	40	66	67	57	58
1984	63	74	59	51	73	59	68	94	76	80	134	209
1985	363	540	186	227	503	252	130	120	110	151	275	401
1986	442	423	655	511	166	88	84	108	93	79	128	204
1987	344	543	1467	1563	881	291	207	164	171	199	291	524
1988	558	345	834	737	223	210	148	161	203	223	424	622
1989	545	386	368	667	915	327	85	70	96	159	303	426
1990	406	504	491	932	675	271	165	128	138	199	417	587
Average	377	402	619	611	406	209	127	128	135	151	251	356

Old River at Rock Slough, 106
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2617	2600	2844	3497	3944	4004	3886	4012	4420	4403	3549	3025
1977	3274	3385	3530	4016	4330	4435	4060	3907	3714	3853	4010	3693
1978	3634	3462	3620	5663	6443	6440	5285	4074	3408	3161	3039	2936
1979	2964	2846	2876	4487	5894	4806	4134	4513	3246	3042	3105	2952
1980	2782	2696	3075	4475	7695	6785	4627	4527	3506	3260	3079	3038
1981	2879	2846	2916	3564	4137	4031	3795	3975	4208	4360	3689	3044
1982	2912	2878	3430	5314	5240	6222	4666	3930	3403	3172	3095	2846
1983	2911	3542	4350	7681	6503	5071	4638	3484	4353	3929	3279	3022
1984	3171	3791	4408	4829	5687	4482	3645	3813	3330	3065	3023	2874
1985	2695	2947	3411	3666	4050	4491	4459	4251	3767	3626	3516	3090
1986	3049	3004	3310	4050	6562	6239	5474	4574	3719	3244	3035	2882
1987	2777	2816	2895	3420	4160	4416	4924	4732	4519	4285	4044	3575
1988	3483	3254	3183	3865	4521	5717	5004	4088	4198	4192	3905	3364
1989	3300	3103	3149	3745	4274	3909	3203	3222	3342	3342	3454	3012
1990	2785	2826	3117	3492	4006	4324	4046	3644	3644	3571	3561	3193
Average	3016	3066	3341	4384	5163	5025	4390	4063	3785	3634	3426	3103

SJR @ Antioch (51)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1145	1025	1824	2880	3089	2558	2645	3457	2650	3751	4548	4587	34,157
1977	6272	6806	6426	6287	4305	3393	3721	4315	4574	5029	5785	6363	63,276
1978	5093	4596	3516	496	214	215	202	195	605	1230	2252	2014	20,628
1979	4753	6167	5775	1225	248	204	436	1072	740	1495	2530	3577	28,222
1980	4774	3715	1731	250	202	184	198	309	686	1228	1904	2814	17,995
1981	4781	5680	2889	391	201	187	518	2083	2774	2821	3377	3990	29,692
1982	4674	1221	202	207	184	196	174	169	181	543	909	396	9,056
1983	180	180	179	213	197	188	172	164	169	177	217	178	2,214
1984	192	176	177	179	181	179	323	1204	1217	1370	1828	3094	10,118
1985	5505	1374	345	2103	1720	779	1798	2010	2193	2729	3564	4144	28,264
1986	4660	4453	3117	1342	253	185	182	298	887	1190	2058	3435	21,858
1987	6175	7147	5565	4014	2105	685	775	2166	2787	3317	4424	4959	44,119
1988	4945	4769	4257	1296	856	2402	3375	3681	2790	3851	5610	6079	43,911
1989	5834	5955	5759	5873	4167	718	333	1133	2129	2981	4048	4260	42,970
1990	5901	6651	6421	4753	2312	2306	2256	2588	2880	3739	5236	5889	50,712
76 - 90 AVG	4,312	3,994	3,212	2,101	1,349	958	1,141	1,656	1,789	2,362	3,219	3,719	29,813

SJR @ Antioch (51)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1229	1084	2047	3321	3568	2925	3031	4015	3035	4369	5340	5392	39,356
1977	7433	8072	7606	7440	5041	3937	4333	5050	5361	5910	6826	7532	74,541
1978	5998	5385	4069	401	59	60	55	61	582	1322	2561	2277	22,810
1979	5595	7308	6831	1300	88	57	356	1131	732	1645	2899	4169	32,111
1980	5621	4340	1934	127	55	46	70	205	664	1320	2141	3246	19,769
1981	5628	6717	3335	303	66	53	457	2352	3190	3250	3926	4670	33,947
1982	5499	1321	84	58	48	55	43	40	54	494	938	321	8,955
1983	61	51	50	64	54	50	42	38	41	47	95	56	649
1984	73	48	49	46	44	44	225	1294	1309	1493	2048	3586	10,259
1985	6508	1505	255	2381	1911	768	2002	2263	2488	3140	4152	4857	32,230
1986	5482	5229	3606	1451	115	50	52	189	660	1267	2319	3996	24,416
1987	7317	8494	6576	4697	2377	656	764	2450	3204	3850	5192	5842	51,419
1988	5827	5611	4986	1399	861	2733	3914	4289	3211	4496	6626	7195	51,148
1989	6658	7041	6805	6943	4868	701	241	1212	2416	3422	4739	4997	50,043
1990	6987	7892	7608	5589	2625	2614	2562	2970	3057	4362	6174	6966	59,406
76 - 90 AVG	5,061	4,673	3,723	2,368	1,452	983	1,210	1,837	1,999	2,692	3,732	4,340	34,071

SJR @ Antioch (51)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2442	2382	2596	2901	3204	3254	2816	2623	2948	2857	2696	2485	33,204
1977	2241	2229	2372	2582	3070	3253	2834	2662	2834	2953	2973	2792	32,795
1978	2748	2705	2999	4094	4606	4255	3528	3065	2878	2826	2873	2703	39,280
1979	2294	2101	2239	3488	4911	4059	2977	2621	2766	2757	2771	2534	35,518
1980	2315	2281	2731	3826	5011	4112	3139	2796	2843	2810	2841	2623	37,128
1981	2338	2184	2617	3206	3798	3460	2891	2624	2716	2657	2631	2470	33,592
1982	2311	2461	2974	4066	4297	4202	3265	2926	2715	2724	2814	2680	37,435
1983	2476	2877	3512	4622	5286	4391	3653	3062	3038	3203	3034	2662	41,816
1984	2579	2772	3612	3710	4052	3487	2717	2507	2768	2803	2808	2547	36,362
1985	2182	2489	3003	3004	3398	3561	2994	2704	2755	2659	2624	2480	33,833
1986	2345	2363	2753	3270	4920	4101	3144	2886	2959	2991	3013	2630	37,375
1987	2202	2038	2314	2675	3354	3411	2996	2760	2788	2633	2589	2471	32,231
1988	2352	2311	2545	3085	3525	3489	2841	2489	2696	2638	2574	2485	33,030
1989	2437	2358	2395	2591	3120	3139	2543	2431	2584	2566	2577	2469	31,210
1990	2171	2098	2282	2607	3279	3543	2774	2419	2613	2577	2548	2445	31,356
76 - 90 AVG	2,362	2,375	2,730	3,302	3,989	3,714	3,007	2,705	2,793	2,777	2,758	2,565	35,078

SJR @ Antioch (51)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	1269	1815	3763	4547	3781	2654	2701	3765	2753	3219	4472	5065	34,157
1,977	6613	7310	6955	6666	4416	3473	3774	4853	4978	5081	5721	6412	63,276
1,978	5101	4461	3394	492	228	229	194	200	559	1133	1794	3033	20,628
1,979	5877	6402	5123	1353	272	199	438	1239	949	1552	2445	3156	28,222
1,980	4309	3337	1381	255	208	177	206	324	790	1249	1965	3414	17,995
1,981	5859	6749	5280	1167	288	216	1061	2617	2839	3361	4233	4530	29,692
1,982	4838	1153	198	212	193	196	171	165	181	676	1098	460	9,056
1,983	204	178	183	213	183	161	147	160	167	174	228	191	2,214
1,984	210	193	186	177	176	172	298	1078	1256	1452	1815	2818	10,118
1,985	5257	1498	383	2004	2460	1405	1975	2174	2324	3116	4382	4970	28,264
1,986	4742	4354	3106	1251	298	189	176	296	674	1128	1633	2819	21,858
1,987	5883	7097	5597	3937	2032	661	819	2233	2801	3347	4596	6106	44,119
1,988	5691	5549	4817	1392	813	2421	3279	4044	2844	3635	5543	6562	43,911
1,989	6384	6203	5814	5943	4206	702	336	1086	1762	2888	4088	4397	42,970
1,990	6141	6948	6691	4445	2159	2237	2281	2593	2713	3640	4895	5914	50,712
76 - 90 AVG	4,559	4,216	3,525	2,270	1,448	1,006	1,190	1,788	1,839	2,377	3,261	3,990	29,813

SJR @ Antioch (51)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	1379	2042	4398	5341	4406	3043	3100	4388	3161	3727	5248	5970	39,356
1,977	7845	8680	8245	7898	5175	4035	4397	5702	5852	5973	6748	7590	74,541
1,978	6002	5209	3917	396	66	67	51	73	510	1205	2007	3511	22,810
1,979	6954	7590	6042	1458	124	55	361	1335	987	1717	2799	3861	32,111
1,980	5059	3882	1510	116	57	45	86	227	790	1346	2215	3972	19,769
1,981	6934	8012	6231	1247	181	96	1119	3002	3271	3903	4960	5322	33,947
1,982	5697	1238	79	61	52	54	43	39	56	656	1167	398	8,955
1,983	91	51	51	64	54	50	42	38	41	46	111	73	649
1,984	97	58	52	46	42	41	197	1140	1356	1595	2036	3252	10,259
1,985	6208	1656	304	2264	2809	1522	2215	2466	2650	3608	5140	5854	32,230
1,986	5580	5107	3593	1340	135	55	51	192	646	1193	1810	3253	24,416
1,987	6964	8433	6615	4604	2289	627	819	2533	3222	3885	5398	7227	51,419
1,988	6726	6548	5663	1515	805	2753	3795	4726	3273	4230	6542	7780	51,148
1,989	7566	7345	6874	7029	4916	680	245	1153	1970	3333	4786	5163	50,043
1,990	7276	8252	7935	5216	2442	2533	2593	2977	3122	4243	5762	6997	59,406
76 - 90 AVG	5,359	4,940	4,101	2,573	1,570	1,044	1,274	1,999	2,060	2,711	3,782	4,668	34,071

SJR @ Antioch (51)
No-Action Alternative
Dissolved Organic Carbon

Units	are	in	TAF										
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2437	2290	2353	2666	3092	3240	2800	2564	2917	2871	2662	2462	33,204
1,977	2218	2175	2314	2546	3052	3238	2837	2609	2778	2973	3035	2868	32,795
1,978	2860	2858	3042	4091	4852	4296	3341	2936	2860	2870	2882	2565	39,280
1,979	2238	2128	2317	3407	4620	3903	2869	2578	2666	2601	2632	2468	35,518
1,980	2282	2287	2768	3680	4822	3850	2930	2717	2827	2829	2842	2556	37,129
1,981	2240	2088	2342	2995	3571	3242	2689	2480	2675	2638	2628	2477	33,592
1,982	2324	2466	2965	4080	4283	4113	3222	2901	2723	2716	2806	2688	37,435
1,983	2459	2784	3478	4603	5280	4379	3628	3054	3038	3171	3025	2642	41,816
1,984	2541	2747	3604	3883	4009	3418	2697	2548	2743	2694	2712	2512	36,362
1,985	2171	2465	2901	2891	3202	3602	3004	2576	2638	2602	2611	2504	33,833
1,986	2407	2417	2761	3254	4841	4066	3130	2885	2974	2983	2903	2554	37,375
1,987	2172	2026	2305	2651	3336	3409	2935	2669	2767	2681	2686	2505	32,231
1,988	2468	2399	2533	3077	3597	3596	2948	2572	2830	2790	2648	2478	33,030
1,989	2401	2328	2363	2566	3113	3141	2537	2465	2641	2550	2564	2452	31,210
1,990	2155	2063	2250	2632	3272	3495	2710	2370	2547	2537	2547	2420	31,356
76 - 90 AVG	2,358	2,368	2,686	3,255	3,929	3,666	2,952	2,662	2,775	2,767	2,746	2,543	35,078

SJR @ Antioch

SJR @ Antioch (51)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	1269	1815	3763	4547	3781	2654	2701	3765	2753	3219	4472	5065	34,157
1,977	6613	7310	6955	6666	4416	3473	3774	4853	4978	5061	5721	6412	63,276
1,978	5101	4461	3394	492	228	229	194	200	559	1133	1794	3033	20,628
1,979	5877	6402	5123	1353	272	199	438	1239	949	1552	2445	3156	28,222
1,980	4309	3337	1381	255	208	177	206	324	790	1249	1965	3414	17,995
1,981	5859	6749	5280	1167	288	216	1061	2617	2839	3361	4233	4530	29,692
1,982	4838	1153	198	212	193	196	171	165	181	676	1098	460	9,056
1,983	204	178	183	213	183	161	147	160	167	174	228	191	2,214
1,984	210	193	186	177	176	172	298	1078	1256	1452	1815	2818	10,118
1,985	5257	1498	383	2004	2460	1405	1975	2174	2324	3116	4382	4970	28,264
1,986	4742	4354	3106	1251	298	189	176	296	674	1128	1633	2819	21,858
1,987	5883	7097	5597	3937	2032	661	819	2233	2801	3347	4596	6106	44,119
1,988	5691	5549	4817	1392	813	2421	3279	4044	2844	3635	5543	6562	43,911
1,989	6384	6203	5814	5943	4206	702	336	1086	1762	2888	4088	4397	42,970
1,990	6141	6948	6691	4445	2159	2237	2281	2593	2713	3640	4895	5914	50,712
76 - 90 AVG	4,559	4,216	3,525	2,270	1,448	1,006	1,190	1,788	1,839	2,377	3,261	3,990	29,813

SJR @ Antioch (51)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	1379	2042	4398	5341	4406	3043	3100	4388	3161	3727	5248	5970	39,356
1,977	7845	8680	8245	7898	5175	4035	4397	5702	5852	5973	6748	7590	74,541
1,978	6002	5209	3917	396	66	67	51	73	510	1205	2007	3511	22,810
1,979	6954	7590	6042	1458	124	55	361	1335	987	1717	2799	3661	32,111
1,980	5059	3882	1510	116	57	45	86	227	790	1346	2215	3972	19,769
1,981	6934	8012	6231	1247	181	96	1119	3002	3271	3903	4960	5322	33,947
1,982	5697	1238	79	61	52	54	43	39	56	656	1167	398	8,955
1,983	91	51	51	64	54	50	42	38	41	46	111	73	649
1,984	97	58	52	46	42	41	197	1140	1356	1595	2036	3252	10,259
1,985	6208	1656	304	2264	2809	1522	2215	2466	2650	3608	5140	5854	32,230
1,986	5580	5107	3593	1340	135	55	51	192	646	1193	1810	3253	24,416
1,987	6964	8433	6615	4604	2289	627	819	2533	3222	3885	5398	7227	51,419
1,988	6726	6548	5683	1515	805	2753	3795	4726	3273	4230	6542	7780	51,148
1,989	7566	7345	6874	7029	4916	680	245	1153	1970	3333	4786	5163	50,043
1,990	7276	8252	7935	5216	2442	2533	2593	2977	3122	4243	5762	6997	59,406
76 - 90 AVG	5,359	4,940	4,101	2,573	1,570	1,044	1,274	1,999	2,060	2,711	3,782	4,668	34,071

SJR @ Antioch (51)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2437	2290	2353	2686	3092	3240	2800	2564	2917	2871	2662	2462	33,204
1,977	2218	2175	2314	2546	3052	3238	2837	2609	2778	2973	3035	2868	32,795
1,978	2860	2858	3042	4091	4852	4296	3341	2936	2860	2870	2882	2565	39,260
1,979	2238	2128	2317	3407	4620	3903	2869	2578	2666	2601	2632	2468	35,518
1,980	2282	2287	2768	3680	4822	3850	2930	2717	2827	2829	2842	2556	37,128
1,981	2240	2088	2342	2995	3571	3242	2689	2480	2675	2638	2628	2477	33,592
1,982	2324	2466	2965	4080	4283	4113	3222	2901	2723	2716	2806	2688	37,435
1,983	2459	2784	3478	4603	5280	4379	3628	3054	3038	3171	3025	2642	41,816
1,984	2541	2747	3604	3683	4009	3418	2697	2548	2743	2694	2712	2512	36,362
1,985	2171	2465	2901	2891	3202	3602	3004	2576	2638	2602	2611	2504	33,833
1,986	2407	2417	2761	3254	4841	4068	3130	2885	2974	2983	2903	2554	37,375
1,987	2172	2026	2305	2651	3336	3409	2935	2669	2767	2681	2686	2505	32,231
1,988	2468	2399	2533	3077	3597	3596	2948	2572	2830	2790	2648	2478	33,030
1,989	2401	2328	2363	2566	3113	3141	2537	2465	2641	2550	2564	2452	31,210
1,990	2155	2063	2250	2632	3272	3495	2710	2370	2547	2537	2547	2420	31,356
76 - 90 AVG	2,358	2,368	2,686	3,255	3,929	3,666	2,952	2,662	2,775	2,767	2,746	2,543	35,078

SJR @ Antioch (51)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1114	1771	3745	4596	3775	2607	2648	3540	2640	3179	4520	5206	39,341
1977	6645	7235	6897	6615	4363	3407	3773	4796	4966	5120	5747	6440	66,004
1978	5115	4463	3414	496	225	218	193	206	556	1104	1782	3024	20,796
1979	5826	6326	4993	1469	288	198	424	1225	950	1592	2444	3150	28,885
1980	4334	3359	1375	233	199	180	210	327	727	1217	1853	3309	17,323
1981	6157	7194	5423	1399	360	224	1023	2496	2785	3349	4226	4275	38,911
1982	4692	1142	197	207	184	193	174	168	191	734	1272	532	9,686
1983	213	175	175	213	198	188	172	163	168	176	231	189	2,261
1984	208	175	176	179	180	176	300	1083	1258	1453	1813	2815	9,816
1985	5271	1633	399	1999	2428	1399	1833	2095	2285	3292	4554	4989	32,277
1986	4764	4435	3131	1027	232	186	182	305	625	1131	1649	2767	20,434
1987	5804	7012	5517	3874	1993	646	773	2121	2699	3249	4498	5917	44,103
1988	5091	4868	4489	1283	761	2382	3157	3914	2773	3593	5499	6539	44,349
1989	6294	6174	5781	5874	4139	689	332	1065	1783	2918	4100	4382	43,531
1990	6070	6811	6572	4400	2138	2200	2237	2609	2673	3768	5301	6228	51,007
76 - 90 AVG	4,507	4,165	3,486	2,258	1,431	993	1,169	1,741	1,805	2,392	3,299	3,984	31,248

SJR @ Antioch (51)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1192	1988	4376	5399	4399	2987	3035	4115	3024	3678	5306	6141	45,640
1977	7884	8593	8176	7836	5110	3954	4396	5634	5838	6021	6780	7624	77,846
1978	6018	5214	3943	401	64	61	51	79	505	1168	1991	3500	22,995
1979	6893	7498	5885	1598	143	55	345	1319	987	1766	2798	3655	32,942
1980	5089	3909	1503	104	54	45	89	229	713	1305	2077	3845	18,962
1981	7295	8550	6405	1529	268	105	1073	2855	3205	3888	4951	5014	45,138
1982	5521	1226	79	58	48	53	43	40	66	725	1377	485	9,721
1983	102	49	48	64	54	50	42	38	41	47	112	70	717
1984	95	49	49	46	43	43	199	1146	1357	1596	2033	3249	9,905
1985	6224	1820	320	2256	2769	1516	2164	2370	2603	3821	5348	5876	37,087
1986	5606	5204	3623	1070	91	50	52	197	584	1196	1830	3190	22,693
1987	6869	8330	6518	4527	2242	609	762	2395	3096	3764	5278	6998	51,388
1988	5998	5719	5262	1384	741	2705	3647	4566	3186	4179	6489	7752	51,628
1989	7457	7309	6834	6945	4834	666	240	1127	1995	3370	4801	5145	50,723
1990	7191	8086	7790	5161	2416	2488	2541	2996	3073	4397	6253	7377	59,769
76 - 90 AVG	5,296	4,903	4,054	2,559	1,552	1,026	1,245	1,940	2,018	2,728	3,828	4,661	35,810

SJR @ Antioch (51)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2442	2292	2355	2673	3108	3249	2806	2594	2945	2891	2662	2461	32,478
1977	2225	2186	2323	2557	3064	3248	2816	2574	2754	2953	3023	2860	32,583
1978	2857	2857	3038	4090	4851	4298	3342	2939	2865	2889	2907	2570	39,503
1979	2245	2136	2330	3414	4641	3903	2863	2577	2666	2596	2632	2469	34,472
1980	2282	2287	2768	3681	4821	3851	2930	2717	2833	2872	2907	2568	36,517
1981	2206	2038	2326	2950	3548	3265	2709	2510	2704	2647	2631	2500	32,034
1982	2325	2461	2965	4081	4283	4115	3222	2901	2747	2738	2811	2694	37,343
1983	2466	2788	3458	4607	5283	4380	3630	3054	3038	3170	3025	2640	41,539
1984	2539	2748	3605	3687	4010	3425	2701	2549	2743	2694	2712	2512	35,925
1985	2172	2463	3018	2961	3211	3613	3015	2592	2651	2594	2612	2513	33,415
1986	2411	2419	2765	3248	4833	4065	3130	2884	2980	2990	2911	2561	37,197
1987	2181	2035	2313	2658	3341	3412	2991	2776	2866	2761	2761	2578	32,673
1988	2558	2507	2592	3085	3606	3617	3001	2640	2879	2832	2682	2499	34,498
1989	2422	2349	2378	2578	3125	3145	2537	2467	2639	2548	2563	2453	31,204
1990	2163	2080	2266	2639	3274	3494	2713	2380	2585	2560	2537	2419	31,110
76 - 90 AVG	2,386	2,376	2,700	3,261	3,933	3,672	2,960	2,677	2,793	2,782	2,758	2,553	34,833

SJR @ Antioch

SJR @ Antioch (51)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1382	1795	3704	4479	3716	2591	2616	3673	2668	3203	4671	5132	39,628
1977	5865	6143	5799	5877	4231	3379	3694	4686	4834	5068	5749	6391	61,716
1978	5178	4615	3569	514	224	217	193	206	533	1090	1848	3075	21,262
1979	5875	6349	4997	1469	288	198	418	1217	948	1657	2463	3122	29,001
1980	4447	3453	1401	233	199	179	210	326	792	1198	1861	3332	17,631
1981	6204	7216	5429	1464	378	226	1019	2496	2636	3297	4103	4251	38,719
1982	4704	1099	195	207	184	193	174	168	191	713	1256	531	9,615
1983	243	177	175	214	197	188	172	163	168	176	231	193	2,297
1984	212	175	176	179	180	176	299	1082	1295	1465	1807	2809	9,855
1985	5182	1611	418	2042	2447	1414	1938	2016	2220	3293	4506	4846	31,933
1986	4454	4002	2951	1389	258	186	182	303	677	1098	1654	2834	19,988
1987	5828	7015	5516	3873	1989	645	759	2065	2638	3053	4558	6078	44,017
1988	5369	5675	4980	1375	790	2217	3041	3745	2726	3473	5263	6295	44,949
1989	6196	6166	5789	5878	4256	743	328	1094	2080	3179	4483	4527	44,719
1990	6044	6885	6581	4286	2066	2180	2063	2461	2610	3258	4537	5489	48,460
76 - 90 AVG	4,479	4,158	3,445	2,232	1,427	982	1,140	1,713	1,801	2,348	3,266	3,927	30,919

SJR @ Antioch (51)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1516	2017	4326	5258	4328	2967	2996	4275	3055	3706	5488	6051	45,983
1977	6938	7265	6844	6944	4951	3920	4301	5500	5677	5956	6783	7564	72,643
1978	6095	5397	4129	422	64	61	51	79	478	1151	2071	3562	23,560
1979	6953	7526	5890	1598	143	55	338	1309	985	1843	2820	3620	33,080
1980	5226	4024	1535	105	54	44	89	229	792	1283	2087	3873	19,341
1981	7352	8578	6412	1607	290	108	1068	2856	3022	3822	4801	4985	44,901
1982	5535	1173	76	58	48	53	43	40	66	699	1358	483	9,632
1983	138	51	48	64	54	50	42	38	41	47	112	75	760
1984	99	49	49	46	43	43	197	1144	1402	1611	2026	3242	9,961
1985	6117	1793	343	2308	2792	1534	2170	2273	2522	3821	5289	5704	36,666
1986	5231	4682	3406	1508	122	51	52	194	647	1156	1835	3270	22,154
1987	6898	8334	6517	4526	2238	608	744	2324	3019	3525	5349	7193	51,275
1988	6335	6703	5862	1496	777	2502	3502	4358	3125	4034	6204	7457	52,355
1989	7339	7301	6844	6950	4977	732	236	1163	2356	3684	5262	5319	52,163
1990	7159	8176	7803	5024	2328	2463	2327	2814	2996	3780	5329	6482	56,681
76 - 90 AVG	5,262	4,871	4,006	2,528	1,547	1,013	1,210	1,906	2,012	2,675	3,788	4,592	35,410

SJR @ Antioch (51)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2433	2293	2359	2674	3101	3246	2821	2608	2982	2923	2667	2479	32,586
1977	2315	2346	2467	2617	3070	3249	2851	2641	2806	2979	3032	2880	33,253
1978	2873	2841	3043	4096	4834	4287	3342	2939	2867	2891	2900	2565	39,478
1979	2234	2122	2327	3413	4643	3893	2850	2572	2666	2604	2652	2474	34,450
1980	2276	2286	2768	3680	4816	3843	2923	2706	2819	2857	2879	2554	36,407
1981	2189	2023	2318	2945	3553	3262	2705	2506	2774	2791	2748	2538	32,352
1982	2347	2469	2965	4080	4283	4115	3223	2901	2747	2746	2818	2695	37,389
1983	2485	2794	3449	4828	5271	4380	3628	3054	3038	3170	3025	2641	41,563
1984	2542	2748	3604	3683	4010	3418	2697	2548	2739	2693	2713	2513	35,908
1985	2176	2462	3016	2967	3217	3619	3020	2623	2696	2654	2677	2526	33,653
1986	2426	2418	2756	3253	4844	4067	3137	2696	2976	3009	2935	2560	37,277
1987	2179	2033	2312	2658	3342	3412	3021	2852	2949	2852	2799	2537	32,946
1988	2489	2338	2491	3073	3608	3749	3162	2762	2949	2806	2640	2478	34,545
1989	2389	2305	2359	2574	3088	3115	2536	2451	2618	2608	2653	2520	31,216
1990	2184	2068	2254	2645	3285	3515	2857	2482	2615	2609	2576	2445	31,535
76 - 90 AVG	2,369	2,370	2,699	3,266	3,931	3,678	2,985	2,703	2,816	2,813	2,781	2,560	34,971

SJR @ Antioch (51)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2809	2797	3997	4204	3504	2837	2708	3575	2664	3603	5509	5785	43,992
1977	5668	5774	5501	5889	4290	3657	3897	4517	4739	4999	5719	6438	61,088
1978	5149	4639	3538	511	229	220	193	211	527	1061	1861	3156	21,315
1979	5872	6187	5165	1410	273	198	421	1412	1025	1564	2523	3458	29,508
1980	4765	3828	1616	243	199	180	203	336	775	1192	1927	3383	18,647
1981	5549	6427	5179	1617	420	225	1041	2387	2389	3141	4497	4634	37,506
1982	4773	1105	195	208	184	194	174	168	191	789	1544	622	10,147
1983	290	180	173	213	197	188	172	163	168	176	260	261	2,441
1984	317	181	176	179	180	176	300	1082	1258	1495	1796	2790	9,930
1985	5683	1887	467	2067	2461	1471	1900	1804	1928	3188	4651	5139	32,646
1986	4472	4072	3021	1385	259	186	182	303	672	1159	1661	2808	20,180
1987	5829	7016	5514	3870	1991	643	734	2037	2412	2918	4284	5856	43,104
1988	4746	4025	4059	1318	783	2058	3079	3800	2699	3489	5381	6464	41,901
1989	5891	5791	5677	5887	4160	700	310	935	1794	3122	4590	4592	43,449
1990	6038	6889	6600	4289	2061	2171	1991	2723	2733	3844	5498	6208	51,045
76 - 90 AVG	4,523	4,053	3,392	2,219	1,413	1,007	1,154	1,697	1,732	2,384	3,447	4,106	31,127

SJR @ Antioch (51)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3244	3229	4681	4927	4072	3264	3107	4156	3050	4189	6500	6839	51,258
1977	6698	6816	6481	6956	6022	4255	4545	5296	5562	5873	6746	7621	71,871
1978	6060	5428	4095	418	66	62	51	84	470	1140	2086	3659	23,619
1979	6948	7329	6091	1526	125	54	342	1544	1078	1730	2892	4027	33,686
1980	5610	4476	1794	116	54	45	80	240	770	1274	2165	3933	20,557
1981	6558	7621	6109	1791	339	105	1095	2723	2719	3627	5273	5445	43,405
1982	5618	1180	76	59	48	54	43	40	66	790	1705	594	10,273
1983	194	55	47	64	54	50	42	38	41	47	149	156	937
1984	226	56	49	46	43	43	198	1145	1358	1647	2013	3218	10,042
1985	6723	2127	402	2339	2810	1602	2123	2013	2164	3688	5462	6058	37,511
1986	5251	4761	3487	1502	122	51	51	194	641	1229	1843	3239	22,371
1987	6898	8335	6515	4523	2240	605	712	2284	2736	3350	5007	6917	50,122
1988	5571	4681	4730	1423	767	2305	3542	4424	3092	4050	6343	7658	48,586
1989	6968	6844	6707	6961	4859	678	214	968	2004	3611	5390	5396	50,600
1990	7152	8181	7825	5027	2322	2451	2239	3129	3141	4487	6491	7353	59,798
76 - 90 AVG	5,315	4,741	3,939	2,512	1,530	1,042	1,226	1,885	1,926	2,715	4,004	4,808	35,642

SJR @ Antioch (51)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2362	2247	2343	2659	3062	3249	2855	2656	2999	2914	2706	2517	32,569
1977	2393	2401	2505	2650	3090	3289	2877	2631	2804	2982	3032	2863	33,517
1978	2847	2811	3017	4099	4918	4332	3342	2941	2873	2894	2937	2590	39,601
1979	2249	2161	2330	3417	4626	3889	2852	2566	2691	2647	2691	2499	34,618
1980	2301	2276	2752	3679	4820	3860	2943	2729	2847	2908	2952	2588	36,655
1981	2287	2143	2374	2974	3575	3282	2694	2528	2923	3009	2849	2586	33,224
1982	2367	2474	2967	4089	4292	4142	3260	2921	2754	2758	2839	2708	37,571
1983	2501	2800	3410	4607	5271	4383	3630	3058	3042	3175	2971	2730	41,578
1984	2575	2760	3603	3690	4011	3426	2701	2549	2743	2690	2714	2514	35,976
1985	2156	2462	3014	2958	3207	3636	3086	2736	2925	2898	2771	2569	34,418
1986	2490	2518	2806	3267	4857	4066	3141	2899	2977	3013	2953	2567	37,554
1987	2180	2033	2312	2658	3342	3415	3095	2999	3192	3197	3119	2856	34,398
1988	2810	2794	2743	3106	3623	3912	3311	2766	2976	2925	2789	2599	36,354
1989	2506	2376	2379	2580	3128	3145	2538	2528	2843	2813	2708	2536	32,080
1990	2187	2067	2252	2646	3287	3519	2905	2542	2708	2613	2554	2440	31,720
76 - 90 AVG	2,414	2,422	2,720	3,272	3,941	3,703	3,015	2,737	2,886	2,896	2,839	2,611	35,456

SJR @ Antioch, 51
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2312	2865	3629	3581	3327	2111	2120	2865	2419	3442	4134	4493
1977	5252	5807	5761	6277	4682	2671	3396	4769	4526	4574	5655	6407
1978	5287	4934	3530	491	221	214	204	198	506	1325	1920	2995
1979	5790	6273	5143	1537	307	202	207	329	577	1614	2792	3645
1980	4496	3916	2001	325	199	182	182	206	464	1126	1758	3293
1981	6203	7134	5606	2106	555	291	355	978	1716	2770	3871	4308
1982	4925	1224	201	207	185	199	175	172	202	889	1857	991
1983	257	175	172	209	201	187	174	165	169	177	350	246
1984	191	169	176	177	179	177	220	290	703	1273	1730	2856
1985	5151	1629	470	2059	2063	1050	1052	1123	1773	3051	4267	4662
1986	4858	4424	2763	1108	246	187	185	216	500	1130	1756	2875
1987	5658	6977	5691	3865	1940	608	707	1965	2310	2950	4415	5932
1988	4829	5131	4474	1194	813	985	1986	3018	2503	3454	5379	5990
1989	5289	5547	5363	5632	4232	771	233	954	2017	3176	4619	4579
1990	5684	6373	6112	3586	1790	1400	1297	1980	2418	3710	5277	5872
Average	4412	4172	3406	2157	1395	749	833	1282	1520	2311	3319	3943

SJR @ Antioch, 51
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2643	3314	4239	4174	3859	2388	2397	3296	2751	3987	4832	5276
1977	6194	6854	6791	7418	5465	3058	3938	5601	5307	5367	6674	7588
1978	6232	5794	4091	396	62	59	55	54	433	1438	2163	3467
1979	6851	7435	6070	1682	163	57	79	219	524	1790	3217	4253
1980	5285	4584	2263	216	54	46	50	69	382	1195	1966	3827
1981	7351	8479	6630	2385	502	186	262	1012	1898	3171	4510	5051
1982	5802	1324	84	58	48	56	43	41	76	913	2086	1041
1983	155	49	47	62	56	50	42	38	41	49	260	140
1984	73	45	49	45	43	45	99	179	679	1377	1933	3299
1985	6079	1815	410	2331	2329	1096	1095	1184	1972	3521	4997	5480
1986	5720	5192	3182	1170	109	51	49	73	419	1198	1964	3322
1987	6692	8289	6733	4518	2178	564	678	2191	2610	3388	5168	7011
1988	5678	6036	5250	1277	807	1010	2216	3473	2852	4003	6337	7083
1989	6239	6548	6327	6653	4949	766	120	992	2277	3680	5427	5382
1990	6723	7557	7238	4178	1997	1522	1399	2227	2758	4322	6220	6945
Average	5181	4888	3960	2438	1508	730	835	1377	1665	2627	3850	4611

SJR @ Antioch, 51
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2382	2171	2349	2674	3047	3196	2811	2707	3046	3087	2931	2542
1977	2398	2405	2519	2688	3124	3378	2853	2564	2695	2712	2813	2712
1978	2724	2671	2953	4084	4751	4229	3658	3317	3007	2758	2707	2501
1979	2196	2108	2286	3357	4748	3971	2955	2986	2903	2632	2649	2492
1980	2304	2248	2683	3616	4759	3949	3112	3027	2999	2818	2765	2510
1981	2178	2020	2270	2876	3555	3312	2806	2752	3027	3127	3013	2604
1982	2339	2459	2967	4077	4200	4197	3351	3016	2788	2700	2734	2666
1983	2504	2810	3411	4526	5312	4405	3638	3066	2967	3066	2954	2634
1984	2568	2730	3606	3727	4087	3493	2780	2796	2879	2704	2703	2499
1985	2167	2452	2894	2894	3272	3571	3179	2926	2956	2848	2801	2571
1986	2404	2408	2722	3205	4663	4062	3360	3301	3146	2867	2724	2510
1987	2174	2010	2249	2633	3350	3394	3129	3069	3177	3155	3040	2746
1988	2666	2482	2528	3056	3555	3891	3398	2873	2998	3000	2885	2648
1989	2508	2369	2404	2599	3082	3110	2569	2520	2717	2664	2662	2535
1990	2198	2059	2243	2691	3292	3449	2932	2699	2811	2730	2687	2505
Average	2381	2360	2672	3247	3920	3707	3102	2908	2941	2858	2805	2578

DMC Intake (216)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	283	280	399	466	568	611	729	613	649	421	416	415	5,850
1977	517	589	694	744	919	818	767	803	851	706	803	631	8,642
1978	716	689	652	465	359	232	233	281	372	413	371	304	5,087
1979	329	443	530	435	328	290	349	384	379	344	370	333	4,514
1980	429	443	447	219	188	172	312	321	367	367	357	305	3,927
1981	348	406	466	503	536	479	585	470	372	364	404	384	5,317
1982	477	499	403	345	181	185	178	213	275	301	315	300	3,672
1983	284	228	174	252	206	236	168	173	183	228	292	319	2,743
1984	331	201	187	177	265	333	370	436	378	355	354	300	3,687
1985	414	497	424	442	555	503	493	473	374	358	392	390	5,315
1986	480	507	509	500	235	182	257	302	339	477	383	313	4,484
1987	422	525	561	705	757	562	612	565	398	383	391	431	6,312
1988	492	483	527	566	728	569	559	516	654	380	438	546	6,458
1989	611	578	656	715	964	561	428	391	360	338	365	394	6,361
1990	462	579	717	880	963	668	536	536	533	345	409	509	7,137
76 - 90 AVG	440	463	490	494	517	427	438	432	432	385	391	392	5,300

DMC Intake (216)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	123	104	161	217	321	363	333	310	331	238	290	313	3,104
1977	364	424	403	527	710	622	375	393	426	423	477	562	5,706
1978	609	497	380	209	128	57	59	88	149	182	164	144	2,666
1979	169	295	317	214	113	90	125	152	166	151	174	204	2,170
1980	292	307	233	60	49	34	103	113	146	152	152	146	1,787
1981	190	245	239	214	224	194	249	204	183	203	248	278	2,671
1982	336	365	186	126	39	47	33	50	92	114	123	110	1,621
1983	94	62	39	84	58	73	35	37	42	63	103	115	805
1984	121	45	53	35	76	113	138	183	173	156	157	163	1,413
1985	284	368	198	195	309	242	210	218	182	193	244	284	2,927
1986	339	347	285	273	74	46	75	101	127	213	169	168	2,217
1987	282	386	366	519	554	319	279	259	197	210	259	337	3,967
1988	357	301	290	335	356	262	267	294	357	226	324	473	3,842
1989	496	405	383	480	491	322	183	170	180	185	236	269	3,820
1990	324	425	447	717	679	389	284	290	282	199	298	434	4,768
76 - 90 AVG	292	305	265	280	279	212	183	191	202	194	228	268	2,899

DMC Intake (216)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3014	2993	3452	4405	5346	4857	4491	4125	4556	4301	3733	3334	48,607
1977	3473	3598	3730	4366	5086	4926	4553	3951	4586	5335	4973	4354	52,931
1978	4156	4027	4023	5759	6435	4783	4328	3472	3956	3918	3775	3519	52,151
1979	3307	3081	3452	4737	5932	4912	4402	3532	3918	3863	3643	3345	48,124
1980	3158	2943	3433	4324	5761	4654	4497	3518	3965	3743	3641	3512	47,149
1981	3372	3207	3484	4452	5793	5218	4476	4104	4042	3643	3565	3277	48,633
1982	3258	3203	3747	5283	5788	4680	4319	3194	3982	3653	3506	3729	48,342
1983	3629	3089	3729	4433	5811	4779	4342	3183	4080	3620	3665	4004	48,364
1984	3747	2993	3778	4198	5717	4906	4224	3574	3957	3806	3595	3302	47,797
1985	3052	3260	3828	4297	5228	5085	4567	4038	4034	3651	3604	3305	47,949
1986	3319	3313	3726	4588	5727	4670	4489	3462	4061	4115	3889	3383	48,742
1987	3199	3152	3417	4168	5299	5259	4762	4304	4199	3741	3712	3433	48,645
1988	3385	3425	3578	4549	5543	5152	4507	3866	4212	4008	3971	3691	49,887
1989	3777	3581	3614	4326	5447	4856	4025	3487	3717	3595	3642	3271	47,338
1990	3191	3340	3641	4149	5228	5248	4371	3632	4055	3802	3818	3577	48,052
76 - 90 AVG	3,402	3,280	3,642	4,536	5,609	4,932	4,424	3,696	4,088	3,920	3,782	3,536	48,847

DMC Intake (216)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	289	272	394	584	710	660	737	578	657	444	434	450	5,850
1,977	538	612	715	808	961	816	898	736	848	839	677	670	8,642
1,978	752	723	604	451	355	237	237	274	366	482	358	318	5,087
1,979	404	482	506	420	320	274	343	390	369	340	382	359	4,514
1,980	420	416	415	225	174	177	293	318	367	371	345	321	3,927
1,981	396	468	519	486	442	397	518	458	393	389	436	435	5,317
1,982	500	490	403	341	185	184	178	213	272	303	316	301	3,672
1,983	263	225	172	222	159	179	165	173	180	232	284	296	2,743
1,984	308	199	185	177	270	314	349	415	396	347	354	314	3,687
1,985	404	506	433	449	587	541	502	473	416	388	453	456	5,315
1,986	508	508	496	512	221	153	254	301	333	458	352	303	4,484
1,987	402	511	553	744	770	546	633	571	401	398	456	497	6,312
1,988	630	566	550	587	931	491	662	540	620	384	447	565	6,458
1,989	676	611	643	712	925	554	435	389	307	343	388	408	6,361
1,990	466	592	735	876	894	643	535	530	499	369	424	502	7,137
76 - 90 AVG	464	479	488	506	527	411	449	424	428	406	407	413	5,300

DMC Intake (216)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	138	111	156	358	492	395	336	304	343	238	258	336	3,104
1,977	410	472	397	581	772	630	421	406	422	448	495	582	5,706
1,978	641	533	358	233	162	89	51	76	117	192	153	177	2,666
1,979	243	338	289	258	132	90	100	142	148	142	194	233	2,170
1,980	283	280	203	170	49	38	68	110	130	147	141	170	1,787
1,981	248	323	310	288	190	158	204	203	200	210	258	320	2,671
1,982	382	356	192	186	61	47	33	43	74	99	118	125	1,621
1,983	98	87	45	79	57	73	35	37	42	56	81	100	805
1,984	109	89	54	35	54	88	113	154	161	150	163	173	1,413
1,985	269	386	214	212	364	279	222	233	219	204	257	339	2,927
1,986	364	347	279	284	209	46	57	91	118	163	151	156	2,217
1,987	264	377	349	572	587	306	276	255	201	212	262	383	3,967
1,988	493	380	324	364	438	232	323	283	341	227	314	485	3,842
1,989	572	457	384	481	537	331	187	161	139	180	239	294	3,820
1,990	331	443	460	716	667	376	295	301	278	211	292	411	4,768
76 - 90 AVG	322	332	268	321	318	212	181	187	195	192	225	286	2,899

DMC Intake (216)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	3024	2932	3380	4297	5322	4859	4497	4218	4510	4145	3740	3414	48,607
1,977	3488	3554	3742	4383	5062	4904	4610	4322	4527	5102	5099	4532	52,931
1,978	4508	4199	3996	5724	6221	4926	4421	3498	3962	3996	3664	3498	52,151
1,979	3482	3168	3403	4671	5926	4943	4305	3513	3733	3515	3454	3231	48,124
1,980	3112	2937	3449	4348	5762	4782	4421	3466	3973	3791	3627	3496	47,149
1,981	3364	3183	3412	4320	5221	4752	4321	3893	4026	3768	3700	3389	48,633
1,982	3313	3207	3754	5249	5791	4689	4319	3194	3998	3662	3518	3732	48,342
1,983	3439	3158	3730	4408	5804	4778	4342	3184	4080	3676	3644	3862	48,364
1,984	3643	2990	3778	4198	5720	4842	4201	3522	3900	3588	3473	3251	47,797
1,985	3036	3258	3827	4301	5176	5122	4631	3770	3891	3687	3782	3520	47,949
1,986	3463	3366	3718	4615	5734	4672	4498	3447	4075	4053	3651	3249	48,742
1,987	3174	3158	3407	4124	5259	5235	4859	4211	4218	3942	4004	3780	48,645
1,988	3817	3613	3573	4533	5634	5496	4605	4149	4437	4262	4059	3779	49,887
1,989	3828	3519	3571	4303	5475	4866	3973	3604	3691	3573	3631	3303	47,338
1,990	3218	3313	3642	4150	5121	5163	4289	3517	3874	3732	3779	3606	48,052
76 - 90 AVG	3,461	3,304	3,625	4,508	5,549	4,935	4,406	3,701	4,060	3,899	3,788	3,576	48,847

DMC Intake (216)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	284	271	392	582	700	655	649	568	557	414	438	462	5,972
1977	549	659	730	814	914	812	873	704	842	810	670	670	9,047
1978	756	699	622	455	354	237	238	273	366	410	352	317	5,079
1979	404	484	510	417	320	274	342	383	367	341	381	360	4,583
1980	414	402	409	224	189	178	295	318	366	370	346	325	3,836
1981	390	435	485	476	438	428	496	457	400	385	438	431	5,259
1982	487	472	399	341	185	184	178	212	272	304	315	300	3,649
1983	263	225	173	256	206	236	166	174	181	232	285	296	2,693
1984	308	198	187	178	264	313	348	414	396	347	354	314	3,621
1985	401	492	428	446	567	525	499	453	395	380	446	459	5,491
1986	504	519	496	505	239	182	259	301	333	496	357	303	4,494
1987	401	509	551	739	764	544	599	545	395	391	451	498	6,387
1988	636	596	580	595	930	491	595	544	492	339	418	519	6,735
1989	621	596	649	713	912	558	436	374	303	344	407	442	6,355
1990	465	585	707	866	880	634	532	526	420	346	410	506	6,877
76 - 90 AVG	459	476	488	507	524	417	434	416	406	394	405	413	5,339

DMC Intake (216)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	123	101	174	364	479	400	335	306	306	222	253	353	3,416
1977	408	520	440	543	710	615	427	399	427	456	494	584	6,023
1978	635	506	373	204	124	60	62	85	146	180	154	161	2,690
1979	251	340	301	214	116	85	123	152	158	148	196	237	2,321
1980	280	260	195	59	49	37	96	111	145	154	147	171	1,704
1981	248	284	284	260	194	172	207	206	206	207	259	317	2,844
1982	344	331	179	124	40	47	33	50	89	115	125	110	1,587
1983	87	62	38	86	58	73	35	37	41	66	99	105	787
1984	111	43	54	35	75	104	126	166	174	151	164	178	1,381
1985	274	363	210	210	329	266	226	220	199	196	260	348	3,101
1986	362	359	278	276	76	46	76	100	123	221	155	160	2,232
1987	258	367	361	572	572	302	271	249	197	210	263	388	4,010
1988	509	429	370	374	434	229	284	293	299	196	277	430	4,124
1989	506	439	384	483	563	328	189	160	139	179	260	331	3,961
1990	333	440	462	701	630	356	280	289	238	202	279	413	4,623
76 - 90 AVG	315	323	274	300	297	208	185	188	192	194	226	286	2,987

DMC Intake (216)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3021	2932	3378	4293	5319	4859	4511	4144	4507	3983	3732	3453	48,132
1977	3438	3461	3720	4439	5166	4930	4613	4323	4486	5094	5066	4520	53,256
1978	4299	4003	3973	5717	6211	4927	4437	3508	3962	3957	3626	3495	52,115
1979	3431	3140	3430	4680	5926	4942	4305	3511	3728	3551	3470	3230	47,344
1980	3068	2916	3448	4348	5762	4774	4439	3475	3971	3771	3619	3500	47,091
1981	3283	3154	3415	4319	5217	4879	4357	3880	4059	3871	3801	3412	47,647
1982	3322	3208	3750	5248	5790	4880	4319	3194	3995	3663	3517	3730	48,416
1983	3437	3158	3730	4458	5812	4779	4342	3182	4079	3882	3644	3861	48,164
1984	3641	2990	3778	4198	5720	4845	4203	3525	3901	3589	3474	3251	47,115
1985	2982	3232	3825	4329	5211	5099	4588	3883	3936	3699	3800	3498	48,082
1986	3425	3347	3713	4614	5734	4672	4502	3461	4074	4060	3681	3251	48,534
1987	3173	3155	3407	4125	5260	5236	4697	4217	4175	3902	3973	3758	49,078
1988	3725	3506	3548	4528	5554	5511	4613	4082	4193	3857	3944	3754	50,815
1989	3758	3475	3569	4301	5413	4818	3972	3623	3737	3607	3739	3361	47,371
1990	3190	3259	3611	4151	5163	5195	4356	3624	3765	3599	3761	3596	47,270
76 - 90 AVG	3,413	3,262	3,620	4,517	5,551	4,943	4,417	3,709	4,038	3,859	3,790	3,578	48,695

DMC Intake (216)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	283	271	398	571	695	657	725	607	719	453	438	459	6,276
1977	547	615	717	808	953	817	847	720	848	839	678	673	9,062
1978	756	725	605	452	355	237	238	273	367	546	361	318	5,233
1979	404	480	503	424	321	274	341	390	368	339	382	359	4,585
1980	420	420	417	224	189	178	293	317	366	431	348	318	3,921
1981	403	502	540	511	462	411	521	496	392	388	435	426	5,487
1982	480	482	402	341	185	184	178	212	272	309	318	303	3,666
1983	264	225	173	244	205	236	167	174	181	232	285	296	2,682
1984	308	198	187	178	264	313	348	414	396	347	354	314	3,621
1985	405	522	422	433	588	541	499	490	412	398	467	465	5,642
1986	512	518	499	503	238	182	258	301	333	476	354	303	4,477
1987	400	508	551	739	765	544	735	677	426	427	480	490	6,742
1988	609	556	532	571	929	491	768	556	701	397	446	562	7,118
1989	675	618	646	711	930	553	434	375	304	343	389	409	6,387
1990	466	589	733	870	888	643	533	563	598	381	442	542	7,248
76 - 90 AVG	462	482	488	505	531	417	459	438	446	420	412	418	5,476

DMC Intake (216)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	123	101	176	349	471	401	340	317	349	240	257	350	3,474
1977	399	458	420	590	758	603	429	400	429	458	501	587	6,032
1978	645	526	351	201	124	60	62	85	148	245	160	162	2,767
1979	247	332	307	224	118	85	122	155	158	147	198	235	2,328
1980	263	280	204	60	49	38	96	111	145	182	149	163	1,760
1981	260	366	352	319	226	167	220	222	197	206	257	313	3,105
1982	339	344	183	124	40	47	33	50	69	117	127	113	1,606
1983	87	63	39	79	57	73	36	37	42	66	99	105	782
1984	111	43	53	35	75	104	126	166	174	151	164	177	1,379
1985	273	397	203	204	355	273	228	239	213	208	272	352	3,217
1986	368	353	281	273	75	46	76	100	123	211	154	160	2,220
1987	257	365	361	572	572	303	331	313	208	222	266	374	4,144
1988	475	353	303	345	434	227	352	285	368	233	309	480	4,164
1989	571	457	384	481	512	315	186	160	140	178	245	293	3,920
1990	331	438	461	705	664	369	289	314	319	217	312	455	4,874
76 - 90 AVG	318	325	272	304	302	207	195	197	207	205	231	288	3,051

DMC Intake (216)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3021	2931	3394	4322	5340	4861	4497	4187	4504	4153	3753	3439	48,402
1977	3498	3558	3746	4392	5075	4905	4622	4268	4522	5093	5084	4528	53,291
1978	4508	4200	3996	5723	6221	4926	4437	3508	3965	3983	3688	3497	52,652
1979	3482	3169	3389	4672	5934	4940	4298	3511	3731	3514	3453	3231	47,324
1980	3118	2941	3450	4348	5762	4783	4421	3470	3971	3845	3669	3490	47,268
1981	3337	3159	3407	4238	5167	4801	4346	3928	4068	3773	3699	3374	47,297
1982	3283	3194	3753	5248	5791	4689	4319	3194	3998	3693	3534	3736	48,432
1983	3441	3158	3732	4407	5604	4778	4343	3184	4080	3683	3644	3861	48,115
1984	3641	2990	3778	4198	5720	4843	4201	3523	3899	3589	3473	3251	47,106
1985	3046	3265	3844	4224	5166	5123	4636	3785	3907	3727	3824	3533	48,080
1986	3475	3384	3722	4605	5734	4672	4499	3454	4075	4050	3659	3249	48,578
1987	3173	3157	3407	4126	5260	5237	4549	4091	4400	4097	4112	3855	49,464
1988	3908	3735	3597	4537	5539	5526	4544	4248	4505	4367	4114	3804	52,424
1989	3857	3555	3580	4305	5483	4870	3972	3604	3693	3573	3631	3303	47,426
1990	3223	3325	3649	4152	5096	5149	4287	3565	4064	3834	3855	3650	47,849
76 - 90 AVG	3,467	3,315	3,630	4,500	5,539	4,940	4,398	3,701	4,092	3,932	3,813	3,587	48,914

DMC Intake

DMC Intake (216)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	296	272	394	581	700	648	748	613	729	464	447	468	6,360
1977	531	565	622	687	884	797	898	754	850	837	673	672	8,770
1978	767	732	621	454	356	237	238	273	367	546	361	321	5,273
1979	405	482	504	424	322	272	340	390	366	360	380	356	4,601
1980	424	427	417	225	189	178	294	317	366	434	346	318	3,935
1981	405	506	541	514	466	412	518	493	454	456	430	408	5,603
1982	478	473	400	341	185	184	178	212	272	311	318	302	3,654
1983	264	225	173	265	206	236	167	174	181	232	285	296	2,704
1984	308	198	187	178	264	313	348	414	396	347	354	314	3,621
1985	403	518	422	434	585	542	507	526	419	481	442	447	5,726
1986	496	473	482	511	239	182	259	301	333	538	359	304	4,477
1987	403	510	551	739	765	545	736	760	452	515	447	489	6,912
1988	611	530	558	594	930	575	716	669	756	371	427	539	7,276
1989	641	592	638	711	909	558	436	382	317	551	413	428	6,576
1990	462	585	721	860	887	637	794	518	687	353	396	471	7,371
76 - 90 AVG	460	473	482	501	526	421	478	453	463	453	405	409	5,524

DMC Intake (216)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	138	103	175	362	478	406	342	319	357	246	264	360	3,550
1977	375	384	369	454	673	572	437	404	429	456	495	586	5,634
1978	651	534	367	204	125	60	62	85	146	245	160	165	2,804
1979	251	337	308	224	118	84	122	155	157	157	194	232	2,339
1980	287	287	205	60	49	38	96	111	145	183	147	164	1,772
1981	263	372	354	323	231	169	219	221	225	232	245	289	3,143
1982	333	332	179	124	40	47	33	50	89	119	127	112	1,585
1983	87	63	39	90	58	73	35	37	41	66	99	105	793
1984	111	43	54	35	75	104	126	166	174	152	165	177	1,382
1985	271	392	203	203	351	273	231	251	209	238	255	331	3,208
1986	351	307	262	262	76	46	76	100	123	241	156	161	2,181
1987	261	368	361	572	572	303	330	359	220	259	256	377	4,238
1988	479	347	344	373	434	268	327	322	380	209	290	455	4,228
1989	531	433	379	480	566	328	189	164	151	278	251	312	4,062
1990	328	437	460	893	632	360	368	262	349	198	261	371	4,719
76 - 90 AVG	314	316	271	299	299	209	200	200	213	219	224	280	3,043

DMC Intake (216)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3027	2932	3380	4297	5323	4858	4494	4244	4602	4204	3786	3447	48,594
1977	3562	3706	3701	4334	5073	4905	4665	4289	4524	5102	5094	4579	53,534
1978	4494	4223	4019	5730	6257	4922	4437	3507	3965	3983	3688	3497	52,722
1979	3452	3152	3388	4672	5934	4923	4285	3508	3726	3605	3483	3231	47,359
1980	3130	2947	3450	4348	5762	4783	4417	3466	3971	3827	3653	3486	47,240
1981	3321	3149	3405	4237	5175	4798	4339	3922	4295	4102	3832	3400	47,975
1982	3319	3208	3752	5247	5790	4688	4319	3194	3999	3704	3539	3736	48,495
1983	3443	3159	3735	4514	5813	4779	4342	3182	4079	3682	3644	3861	48,233
1984	3642	2990	3778	4198	5720	4843	4199	3523	3900	3590	3474	3251	47,108
1985	3031	3258	3844	4232	5176	5129	4637	3822	3996	3957	3875	3496	48,453
1986	3424	3303	3704	4621	5735	4672	4505	3459	4074	4014	3682	3251	48,444
1987	3173	3155	3407	4126	5259	5235	4531	3971	4528	4261	4123	3760	49,529
1988	3755	3505	3544	4528	5540	5659	4712	4245	4455	4137	3977	3736	51,793
1989	3760	3481	3565	4304	5408	4815	3973	3550	3740	4062	3938	3402	47,998
1990	3214	3288	3621	4144	5169	5192	4541	3779	4255	3741	3746	3542	48,232
76 - 90 AVG	3,450	3,297	3,620	4,502	5,542	4,947	4,426	3,711	4,141	3,998	3,836	3,578	49,047

DMC Intake (216)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	283	280	399	466	568	611	729	613	649	421	416	415	5,850
1977	517	589	694	744	919	818	767	803	851	706	603	631	8,642
1978	716	689	652	465	359	232	233	281	372	413	371	304	5,087
1979	329	443	530	435	328	290	349	384	379	344	370	333	4,514
1980	429	443	447	219	188	172	312	321	367	367	357	305	3,927
1981	348	406	466	503	536	479	585	470	372	364	404	384	5,317
1982	477	499	403	345	181	185	178	213	275	301	315	300	3,672
1983	284	228	174	252	206	236	168	173	183	228	292	319	2,743
1984	331	201	187	177	265	333	370	436	378	355	354	300	3,687
1985	414	497	424	442	555	503	493	473	374	358	392	390	5,315
1986	480	507	509	500	235	182	257	302	339	477	383	313	4,484
1987	422	525	561	705	757	562	612	565	398	383	391	431	6,312
1988	492	483	527	566	728	569	559	516	654	380	438	546	6,458
1989	611	578	656	715	964	561	428	391	360	338	365	394	6,361
1990	462	579	717	880	963	668	536	536	533	345	409	509	7,137
76 - 90 AVG	440	463	490	494	517	427	438	432	432	385	391	392	5,300

DMC Intake (216)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	123	104	161	217	321	363	333	310	331	238	290	313	3,104
1977	364	424	403	527	710	622	375	393	426	423	477	562	5,706
1978	609	497	380	209	128	57	59	88	149	182	164	144	2,686
1979	169	295	317	214	113	90	125	152	166	151	174	204	2,170
1980	292	307	233	60	49	34	103	113	146	152	152	146	1,787
1981	190	245	239	214	224	194	249	204	183	203	248	278	2,671
1982	336	365	186	126	39	47	33	50	92	114	123	110	1,621
1983	94	62	39	84	58	73	35	37	42	63	103	115	805
1984	121	45	53	35	76	113	138	163	173	156	157	163	1,413
1985	284	368	198	195	309	242	210	218	182	193	244	284	2,927
1986	339	347	285	273	74	46	75	101	127	213	169	168	2,217
1987	282	386	368	519	554	319	279	259	197	210	259	337	3,967
1988	357	301	290	335	356	262	267	294	357	226	324	473	3,842
1989	496	405	383	480	491	322	183	170	180	185	236	289	3,820
1990	324	425	447	717	679	389	264	290	282	199	298	434	4,768
76 - 90 AVG	292	305	265	280	279	212	183	191	202	194	228	268	2,899

DMC Intake (216)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3014	2993	3452	4405	5346	4857	4491	4125	4556	4301	3733	3334	48,607
1977	3473	3598	3730	4366	5086	4926	4553	3951	4586	5335	4973	4354	52,931
1978	4156	4027	4023	5759	6435	4783	4328	3472	3956	3918	3775	3519	52,151
1979	3307	3081	3452	4737	5932	4912	4402	3532	3918	3863	3643	3345	48,124
1980	3158	2943	3433	4324	5761	4654	4497	3518	3965	3743	3641	3512	47,149
1981	3372	3207	3484	4452	5793	5218	4476	4104	4042	3643	3565	3277	48,633
1982	3258	3203	3747	5283	5788	4680	4319	3194	3982	3653	3506	3729	48,342
1983	3629	3089	3729	4433	5811	4779	4342	3183	4080	3620	3665	4004	48,364
1984	3747	2993	3778	4198	5717	4906	4224	3574	3957	3806	3595	3302	47,797
1985	3052	3260	3828	4297	5228	5085	4567	4038	4034	3651	3604	3305	47,949
1986	3319	3313	3726	4588	5727	4670	4489	3462	4061	4115	3889	3383	48,742
1987	3199	3152	3417	4168	5299	5259	4762	4304	4199	3741	3712	3433	48,645
1988	3385	3425	3578	4549	5543	5152	4507	3866	4212	4008	3971	3691	49,887
1989	3777	3581	3614	4326	5447	4856	4025	3487	3717	3595	3642	3271	47,338
1990	3191	3340	3641	4149	5228	5248	4371	3632	4055	3802	3818	3577	48,052
76 - 90 AVG	3,402	3,280	3,642	4,536	5,609	4,932	4,424	3,696	4,088	3,920	3,782	3,536	48,847

DMC Intake (216)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	283	280	399	466	568	611	729	613	649	421	416	415	5,850
1977	517	589	694	744	919	818	767	803	851	706	603	631	8,642
1978	716	689	652	465	359	232	233	281	372	413	371	304	5,087
1979	329	443	530	435	328	290	349	384	379	344	370	333	4,514
1980	429	443	447	219	188	172	312	321	367	367	357	305	3,927
1981	348	406	466	503	536	479	585	470	372	364	404	384	5,317
1982	477	499	403	345	181	185	178	213	275	301	315	300	3,672
1983	284	228	174	252	206	236	168	173	183	228	292	319	2,743
1984	331	201	187	177	265	333	370	436	378	355	354	300	3,687
1985	414	497	424	442	555	503	493	473	374	358	392	390	5,315
1986	480	507	509	500	235	182	257	302	339	477	383	313	4,484
1987	422	525	561	705	757	582	612	565	398	383	391	431	6,312
1988	492	483	527	566	728	569	559	516	654	380	438	546	6,458
1989	611	578	656	715	964	561	428	391	360	338	365	394	6,361
1990	462	579	717	880	963	668	536	536	533	345	409	509	7,137
76 - 90 AVG	440	463	490	494	517	427	438	432	432	385	391	392	5,300

DMC Intake (216)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	123	104	161	217	321	363	333	310	331	238	290	313	3,104
1977	364	424	403	527	710	622	375	393	426	423	477	562	5,706
1978	609	497	380	209	128	57	59	88	149	182	164	144	2,666
1979	169	295	317	214	113	90	125	152	166	151	174	204	2,170
1980	292	307	233	60	49	34	103	113	146	152	152	146	1,787
1981	190	245	239	214	224	194	249	204	183	203	248	278	2,671
1982	336	365	186	126	39	47	33	50	92	114	123	110	1,621
1983	94	62	39	84	58	73	35	37	42	63	103	115	805
1984	121	45	53	35	76	113	138	183	173	156	157	163	1,413
1985	284	368	198	195	309	242	210	218	182	193	244	284	2,927
1986	339	347	285	273	74	46	75	101	127	213	169	168	2,217
1987	282	386	366	519	554	319	279	259	197	210	259	337	3,967
1988	357	301	290	335	356	262	267	294	357	226	324	473	3,842
1989	496	405	383	480	491	322	183	170	180	185	236	289	3,820
1990	324	425	447	717	679	389	284	290	282	199	298	434	4,768
76 - 90 AVG	292	305	265	280	279	212	183	191	202	194	228	268	2,899

DMC Intake (216)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3014	2993	3452	4405	5346	4857	4491	4125	4556	4301	3733	3334	48,607
1977	3473	3598	3730	4366	5086	4926	4553	3951	4586	5335	4973	4354	52,931
1978	4156	4027	4023	5759	6435	4783	4328	3472	3956	3918	3775	3519	52,151
1979	3307	3081	3452	4737	5832	4912	4402	3532	3918	3863	3643	3345	48,124
1980	3158	2943	3433	4324	5761	4654	4497	3518	3965	3743	3641	3512	47,149
1981	3372	3207	3484	4452	5793	5218	4476	4104	4042	3643	3565	3277	48,633
1982	3258	3203	3747	5283	5788	4680	4319	3194	3982	3653	3506	3729	48,342
1983	3629	3089	3729	4433	5811	4779	4342	3183	4080	3620	3665	4004	48,364
1984	3747	2993	3778	4198	5717	4906	4224	3574	3957	3808	3595	3302	47,797
1985	3052	3260	3828	4297	5228	5085	4567	4038	4034	3651	3604	3305	47,949
1986	3319	3313	3726	4588	5727	4670	4489	3462	4061	4115	3889	3383	48,742
1987	3199	3152	3417	4168	5299	5259	4762	4304	4199	3741	3712	3433	48,645
1988	3385	3425	3578	4549	5543	5152	4507	3866	4212	4008	3971	3691	49,887
1989	3777	3581	3614	4326	5447	4856	4025	3487	3717	3595	3642	3271	47,338
1990	3191	3340	3641	4149	5228	5248	4371	3632	4055	3802	3818	3577	48,052
76 - 90 AVG	3,402	3,280	3,642	4,538	5,609	4,932	4,424	3,698	4,088	3,920	3,782	3,536	48,847

North Bay Aqueduct (406)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	183	181	187	206	234	233	239	221	204	197	194	194	2,473
1977	196	198	195	205	237	251	259	269	258	241	229	226	2,764
1978	227	231	229	255	333	491	545	427	268	211	197	195	3,609
1979	196	194	193	264	408	469	418	284	222	199	193	194	3,234
1980	189	185	201	269	397	523	428	326	237	203	194	194	3,346
1981	195	197	197	224	288	280	254	242	210	196	191	191	2,665
1982	188	204	234	294	446	440	523	475	324	223	198	192	3,741
1983	189	206	246	279	422	545	643	480	290	212	193	191	3,896
1984	191	198	223	312	318	270	266	224	202	194	191	192	2,781
1985	191	217	255	252	263	268	281	278	223	200	193	193	2,814
1986	193	198	215	262	334	461	529	392	258	210	198	196	3,446
1987	196	196	194	206	243	275	289	266	224	203	196	197	2,685
1988	198	196	201	236	310	345	336	288	238	215	206	208	2,977
1989	210	210	206	212	236	260	267	243	213	200	195	194	2,646
1990	190	189	192	209	249	284	310	272	227	210	203	204	2,739
76 - 90 AVG	195	200	211	248	315	360	372	312	240	208	198	197	3,054

North Bay Aqueduct (406)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	60	57	58	61	69	70	79	80	79	72	65	66	816
1977	73	75	67	65	73	78	83	97	104	104	97	92	1,008
1978	96	103	102	109	137	193	224	178	107	75	65	66	1,455
1979	71	69	62	87	144	175	159	107	83	69	63	65	1,154
1980	64	60	65	93	144	203	166	126	90	71	63	66	1,211
1981	70	71	66	70	93	91	86	89	78	68	62	64	908
1982	64	76	91	109	169	165	220	214	139	81	65	64	1,457
1983	64	77	101	104	160	216	274	210	118	74	62	63	1,523
1984	66	71	81	123	120	93	96	82	75	67	62	65	1,001
1985	67	86	108	94	89	89	103	113	87	71	63	66	1,036
1986	69	73	77	93	118	176	219	163	102	75	66	67	1,298
1987	71	70	64	63	74	90	104	102	88	74	66	69	935
1988	74	72	70	80	106	121	123	112	96	84	74	76	1,088
1989	83	85	77	72	76	84	94	93	83	73	66	66	952
1990	65	65	63	67	78	93	112	105	89	80	72	74	963
76 - 90 AVG	70	74	77	86	110	129	143	125	95	76	67	69	1,120

North Bay Aqueduct (406)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3742	3504	3807	4807	5804	5516	5765	5105	4820	4729	4770	4648	57,017
1977	4535	4330	4060	4575	5964	6249	6515	6985	6912	6745	6726	6742	70,338
1978	6647	6540	6163	7313	10922	15320	14001	10299	6310	4795	4566	4435	97,311
1979	4264	3964	3834	7303	12555	12725	10213	6511	5051	4488	4489	4420	79,817
1980	3965	3566	4341	7193	11278	14081	10542	7583	5440	4582	4487	4415	81,473
1981	4245	4131	4088	5445	7739	7087	5967	5487	4768	4456	4447	4337	62,177
1982	3979	4659	5909	8248	12964	11977	13249	11583	7792	5108	4560	4281	94,309
1983	3946	4691	6083	7422	12149	15217	16410	11466	6846	4806	4423	4257	97,716
1984	4039	4230	5350	8376	8196	6708	6356	4954	4543	4388	4447	4398	65,985
1985	4109	5326	6734	6232	6490	6613	6718	6496	5188	4647	4572	4501	67,626
1986	4274	4320	5020	6807	9039	12636	12929	9208	5930	4766	4598	4464	83,991
1987	4255	4056	3909	4588	6043	6963	7254	6294	5301	4846	4788	4772	63,069
1988	4586	4252	4421	5962	8472	9159	8767	7271	5967	5511	5378	5415	75,161
1989	5298	5015	4674	4894	5981	6620	6499	5743	5096	4855	4800	4625	64,100
1990	4171	3941	3996	4823	6387	7099	7739	6638	5477	5255	5247	5221	65,994
76 - 90 AVG	4,404	4,435	4,826	6,266	8,666	9,598	9,262	7,440	5,696	4,932	4,820	4,729	75,072

North Bay Aqueduct, 406
Cumulative Impact
Electrical Conductivity

Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	175	175	178	199	214	218	226	213	199	194	194	191
1977	193	193	191	204	236	246	255	265	249	233	222	222
1978	223	227	224	265	370	495	527	355	231	195	186	184
1979	186	185	185	271	415	470	368	255	208	189	185	186
1980	182	179	200	280	429	527	361	285	214	191	186	185
1981	186	189	188	223	282	251	245	236	207	196	194	192
1982	187	202	227	298	462	402	533	427	270	202	187	184
1983	181	204	242	290	487	610	672	428	257	199	187	186
1984	185	193	225	335	276	246	238	204	190	184	182	182
1985	180	210	239	236	246	245	277	269	218	198	193	193
1986	191	195	212	259	345	527	502	326	225	195	186	184
1987	185	186	185	200	232	255	294	294	258	227	214	213
1988	215	213	212	235	299	343	306	248	212	199	197	199
1989	198	195	193	205	231	244	250	224	201	193	191	189
1990	185	183	187	206	250	287	287	241	209	199	196	198
Average	190	195	206	247	318	358	356	285	223	200	193	193

North Bay Aqueduct, 406
Cumulative Impact
Bromide

Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	53	51	50	55	59	63	73	76	75	70	65	65
1977	69	70	63	63	71	75	82	97	102	100	91	88
1978	93	101	97	111	148	192	217	141	85	63	56	58
1979	62	60	55	87	147	177	136	92	74	61	56	60
1980	58	55	63	96	156	205	134	105	76	61	56	58
1981	62	63	58	67	89	78	82	86	76	68	64	64
1982	63	73	85	108	175	149	230	190	107	67	57	57
1983	57	73	96	103	186	246	292	183	99	65	57	59
1984	60	65	81	135	97	81	81	69	65	58	54	57
1985	57	78	94	81	78	77	102	107	84	70	64	66
1986	67	69	74	90	122	208	208	128	82	64	56	58
1987	61	61	56	57	68	80	104	117	109	94	80	81
1988	87	88	81	85	105	122	110	91	79	71	67	70
1989	73	70	63	62	69	75	86	82	75	67	63	62
1990	61	59	58	62	76	94	102	88	78	71	66	69
Average	66	69	72	84	110	128	136	110	84	70	63	65

North Bay Aqueduct, 406
Cumulative Impact
Dissolved Organic Carbon

Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3241	3165	3374	4493	4804	5069	5287	4773	4582	4558	4664	4469
1977	4269	4012	3831	4502	5695	5871	6275	6791	6610	6444	6447	6505
1978	6358	6194	5773	7752	12510	14414	12722	8124	5039	4096	4008	3849
1979	3699	3442	3489	7432	11298	11848	8579	5511	4470	4002	4045	3998
1980	3530	3246	4238	7271	11501	13385	8403	6246	4586	3995	4013	3896
1981	3724	3652	3638	5327	6948	6091	5585	5247	4639	4448	4519	4334
1982	3862	4521	5530	8255	12881	10471	12842	10101	6077	4266	4025	3781
1983	3437	4373	5524	7555	13200	16008	16438	9966	5806	4274	4102	3929
1984	3656	3903	5238	8640	6664	5899	5215	4141	3943	3832	3911	3838
1985	3489	4823	5564	5481	5693	5866	6439	6127	4974	4533	4535	4428
1986	4092	4106	4829	6587	9208	13337	11778	7199	4801	4098	4002	3854
1987	3652	3517	3467	4353	5397	6227	7551	7514	6660	6004	5799	5756
1988	5573	5167	4984	6024	8488	9235	7619	5747	4891	4671	4761	4742
1989	4453	4103	3923	4567	5533	5772	5734	5001	4569	4416	4511	4265
1990	3817	3558	3699	4668	6054	6908	6846	5496	4784	4687	4748	4752
Average	4057	4119	4473	6194	8392	9093	8488	6532	5095	4555	4539	4426

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North Bay Aqueduct, 406
Cumulative Impact
Electrical Conductivity

Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	175	175	178	199	214	218	226	213	199	194	194	191
1977	193	193	191	204	236	246	255	265	249	233	222	222
1978	223	227	224	265	370	495	527	355	231	195	186	184
1979	186	185	185	271	415	470	368	255	208	189	185	186
1980	182	179	200	280	429	527	361	285	214	191	186	185
1981	186	189	188	223	282	251	245	236	207	196	194	192
1982	187	202	227	298	462	402	533	427	270	202	187	184
1983	181	204	242	290	487	610	672	428	257	199	187	186
1984	185	193	225	335	276	246	238	204	190	184	182	182
1985	180	210	239	236	246	245	277	269	218	198	193	193
1986	191	195	212	259	345	527	502	326	225	195	186	184
1987	185	186	185	200	232	255	294	294	258	227	214	213
1988	215	213	212	235	299	343	306	248	212	199	197	199
1989	198	195	193	205	231	244	250	224	201	193	191	189
1990	185	183	187	206	250	287	287	241	209	199	196	198
Average	190	195	206	247	318	358	356	285	223	200	193	193

North Bay Aqueduct, 406
Cumulative Impact
Bromide

Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	53	51	50	55	59	63	73	76	75	70	65	65
1977	69	70	63	63	71	75	82	97	102	100	91	88
1978	93	101	97	111	148	192	217	141	85	63	56	58
1979	62	60	55	87	147	177	136	92	74	61	56	60
1980	58	55	63	96	156	205	134	105	76	61	56	58
1981	62	63	58	67	89	78	82	86	76	68	64	64
1982	63	73	85	108	175	149	230	190	107	67	57	57
1983	57	73	96	103	186	246	292	183	99	65	57	59
1984	60	65	81	135	97	81	81	69	65	58	54	57
1985	57	78	94	81	78	77	102	107	84	70	64	66
1986	67	69	74	90	122	208	208	128	82	64	56	58
1987	61	61	56	57	68	80	104	117	109	94	80	81
1988	87	88	81	85	105	122	110	91	79	71	67	70
1989	73	70	63	62	69	75	86	82	75	67	63	62
1990	61	59	58	62	76	94	102	88	78	71	66	69
Average	66	69	72	84	110	128	136	110	84	70	63	65

North Bay Aqueduct, 406
Cumulative Impact
Dissolved Organic Carbon

Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3241	3165	3374	4493	4804	5069	5287	4773	4582	4558	4664	4469
1977	4269	4012	3831	4502	5695	5871	6275	6791	6610	6444	6447	6505
1978	6358	6194	5773	7752	12510	14414	12722	8124	5039	4096	4008	3849
1979	3699	3442	3489	7432	11298	11848	8579	5511	4470	4002	4045	3998
1980	3530	3246	4238	7271	11501	13385	8403	6246	4586	3995	4013	3896
1981	3724	3652	3638	5327	6948	6091	5585	5247	4639	4448	4519	4334
1982	3862	4521	5530	8255	12881	10471	12842	10101	6077	4266	4025	3781
1983	3437	4373	5524	7555	13200	16008	16438	9966	5806	4274	4102	3929
1984	3656	3903	5238	8640	6664	5899	5215	4141	3943	3832	3911	3838
1985	3489	4823	5564	5481	5693	5866	6439	6127	4974	4533	4535	4428
1986	4092	4106	4829	6587	9208	13337	11778	7199	4801	4098	4002	3854
1987	3652	3517	3467	4353	5397	6227	7551	7514	6660	6004	5799	5756
1988	5573	5167	4984	6024	8488	9235	7619	5747	4891	4671	4761	4742
1989	4453	4103	3923	4567	5533	5772	5734	5001	4569	4416	4511	4265
1990	3817	3558	3699	4668	6054	6908	6846	5496	4784	4687	4748	4752
Average	4057	4119	4473	6194	8392	9093	8488	6532	5095	4555	4539	4426

North Bay Aqueduct, 406
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	175	175	178	199	214	218	226	213	199	194	194	191
1977	193	193	191	204	236	246	255	265	249	233	222	222
1978	223	227	224	265	370	495	527	355	231	195	186	184
1979	186	185	185	271	415	470	368	255	208	189	185	186
1980	182	179	200	280	429	527	361	285	214	191	186	185
1981	186	189	188	223	282	251	245	236	207	196	194	192
1982	187	202	227	298	462	402	533	427	270	202	187	184
1983	181	204	242	290	487	610	672	428	257	199	187	186
1984	185	193	225	335	276	246	238	204	190	184	182	182
1985	180	210	239	236	246	245	277	269	218	198	193	193
1986	191	195	212	259	345	527	502	326	225	195	186	184
1987	185	186	185	200	232	255	294	294	258	227	214	213
1988	215	213	212	235	299	343	306	248	212	199	197	199
1989	198	195	193	205	231	244	250	224	201	193	191	189
1990	185	183	187	206	250	287	287	241	209	199	196	198
Average	190	195	206	247	318	358	356	285	223	200	193	193

North Bay Aqueduct, 406
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	53	51	50	55	59	63	73	76	75	70	65	65
1977	69	70	63	63	71	75	82	97	102	100	91	88
1978	93	101	97	111	148	192	217	141	85	63	56	58
1979	62	60	55	87	147	177	136	92	74	61	56	60
1980	58	55	63	96	156	205	134	105	76	61	56	58
1981	62	63	58	67	89	78	82	86	76	68	64	64
1982	63	73	85	108	175	149	230	190	107	67	57	57
1983	57	73	96	103	186	246	292	183	99	65	57	59
1984	60	65	81	135	97	81	81	69	65	58	54	57
1985	57	78	94	81	78	77	102	107	84	70	64	66
1986	67	69	74	90	122	208	208	128	82	64	56	58
1987	61	61	56	57	68	80	104	117	109	94	80	81
1988	87	88	81	85	105	122	110	91	79	71	67	70
1989	73	70	63	62	69	75	86	82	75	67	63	62
1990	61	59	58	62	76	94	102	88	78	71	66	69
Average	66	69	72	84	110	128	136	110	84	70	63	65

North Bay Aqueduct, 406
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3241	3165	3374	4493	4804	5069	5287	4773	4582	4558	4664	4469
1977	4269	4012	3831	4502	5695	5871	6275	6791	6610	6444	6447	6505
1978	6358	6194	5773	7752	12510	14414	12722	8124	5039	4096	4008	3849
1979	3699	3442	3489	7432	11298	11848	8579	5511	4470	4002	4045	3998
1980	3530	3246	4238	7271	11501	13385	8403	6246	4586	3995	4013	3896
1981	3724	3652	3638	5327	6948	6091	5585	5247	4639	4448	4519	4334
1982	3862	4521	5530	8255	12881	10471	12842	10101	6077	4266	4025	3781
1983	3437	4373	5524	7555	13200	16008	16438	9966	5806	4274	4102	3929
1984	3656	3903	5238	8640	6664	5899	5215	4141	3943	3832	3911	3838
1985	3489	4823	5564	5481	5693	5866	6439	6127	4974	4533	4535	4428
1986	4092	4106	4829	6567	9208	13337	11778	7199	4801	4098	4002	3854
1987	3652	3517	3467	4353	5397	6227	7551	7514	6660	6004	5799	5756
1988	5573	5167	4984	6024	8488	9235	7619	5747	4891	4671	4761	4742
1989	4453	4103	3923	4567	5533	5772	5734	5001	4569	4416	4511	4265
1990	3817	3558	3699	4668	6054	6906	6846	5496	4784	4687	4748	4752
Average	4057	4119	4473	6194	8392	9093	8488	6532	5095	4555	4539	4426

North Bay Aqueduct, 406
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	175	175	178	199	214	218	226	213	199	194	194	191
1977	193	193	191	204	236	246	255	265	249	233	222	222
1978	223	227	224	265	370	495	527	355	231	195	186	184
1979	186	185	185	271	415	470	368	255	208	189	185	186
1980	182	179	200	280	429	527	361	285	214	191	186	185
1981	186	189	188	223	282	251	245	236	207	196	194	192
1982	187	202	227	298	462	402	533	427	270	202	187	184
1983	181	204	242	290	487	610	672	428	257	199	187	186
1984	185	193	225	335	276	246	238	204	190	184	182	182
1985	180	210	239	236	246	245	277	269	218	198	193	193
1986	191	195	212	259	345	527	502	326	225	195	186	184
1987	185	186	185	200	232	255	294	294	258	227	214	213
1988	215	213	212	235	299	343	306	248	212	199	197	199
1989	198	195	193	205	231	244	250	224	201	193	191	189
1990	185	183	187	206	250	287	287	241	209	199	196	198
Average	190	195	206	247	318	358	356	285	223	200	193	193

North Bay Aqueduct, 406
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	53	51	50	55	59	63	73	76	75	70	65	65
1977	69	70	63	63	71	75	82	97	102	100	91	88
1978	93	101	97	111	148	192	217	141	85	63	56	58
1979	62	60	55	87	147	177	136	92	74	61	56	60
1980	58	55	63	96	156	205	134	105	76	61	56	58
1981	62	63	58	67	89	78	82	86	76	68	64	64
1982	63	73	85	108	175	149	230	190	107	67	57	57
1983	57	73	96	103	186	246	292	183	99	65	57	59
1984	60	65	81	135	97	81	81	69	65	58	54	57
1985	57	78	94	81	78	77	102	107	84	70	64	66
1986	67	69	74	90	122	208	208	128	82	64	56	58
1987	61	61	56	57	88	80	104	117	109	94	80	81
1988	87	88	81	85	105	122	110	91	79	71	67	70
1989	73	70	63	62	69	75	86	82	75	67	63	62
1990	61	59	58	62	76	94	102	88	78	71	66	69
Average	66	69	72	84	110	128	136	110	84	70	63	65

North Bay Aqueduct, 406
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3241	3165	3374	4493	4804	5069	5287	4773	4582	4558	4664	4469
1977	4269	4012	3831	4502	5695	5871	6275	6791	6610	6444	6447	6505
1978	6358	6194	5773	7752	12510	14414	12722	8124	5039	4096	4008	3849
1979	3699	3442	3489	7432	11298	11848	8579	5511	4470	4002	4045	3998
1980	3530	3246	4238	7271	11501	13385	8403	6246	4586	3995	4013	3896
1981	3724	3852	3638	5327	6948	6091	5585	5247	4639	4448	4519	4334
1982	3862	4521	5530	8255	12881	10471	12842	10101	6077	4266	4025	3781
1983	3437	4373	5524	7555	13200	16008	16438	9966	5806	4274	4102	3929
1984	3656	3903	5238	8640	6664	5899	5215	4141	3943	3832	3911	3838
1985	3489	4823	5564	5481	5693	5866	6439	6127	4974	4533	4535	4428
1986	4092	4106	4829	6587	9208	13337	11778	7199	4801	4098	4002	3854
1987	3652	3517	3467	4353	5397	6227	7551	7514	6660	6004	5799	5756
1988	5573	5167	4984	6024	8488	9235	7619	5747	4891	4671	4761	4742
1989	4453	4103	3923	4567	5533	5772	5734	5001	4589	4416	4511	4265
1990	3817	3558	3699	4668	6054	6908	6846	5496	4784	4687	4748	4752
Average	4057	4119	4473	6194	8392	9093	8488	6532	5095	4555	4539	4426

North Bay Aqueduct, 406
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	175	175	178	199	214	218	226	213	199	194	194	191
1977	193	193	191	204	236	246	255	265	249	233	222	222
1978	223	227	224	265	370	495	527	355	231	195	186	184
1979	186	185	185	271	415	470	368	255	208	189	185	186
1980	182	179	200	280	429	527	361	285	214	191	186	185
1981	186	189	188	223	282	251	245	236	207	196	194	192
1982	187	202	227	298	462	402	533	427	270	202	187	184
1983	181	204	242	290	487	610	672	428	257	199	187	186
1984	185	193	225	335	276	246	238	204	190	184	182	182
1985	180	210	239	236	246	245	277	269	218	198	193	193
1986	191	195	212	259	345	527	502	326	225	195	186	184
1987	185	186	185	200	232	255	294	294	258	227	214	213
1988	215	213	212	235	299	343	306	248	212	199	197	199
1989	198	195	193	205	231	244	250	224	201	193	191	189
1990	185	183	187	206	250	287	287	241	209	199	196	198
Average	190	195	206	247	318	358	356	285	223	200	193	193

North Bay Aqueduct, 406
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	53	51	50	55	59	63	73	76	75	70	65	65
1977	69	70	63	63	71	75	82	97	102	100	91	88
1978	93	101	97	111	148	192	217	141	85	63	56	58
1979	62	60	55	87	147	177	136	92	74	61	56	60
1980	58	55	63	96	156	205	134	105	76	61	56	58
1981	62	63	58	67	89	78	82	86	76	68	64	64
1982	63	73	85	108	175	149	230	190	107	67	57	57
1983	57	73	96	103	186	246	292	183	99	65	57	59
1984	60	65	81	135	97	81	81	69	65	58	54	57
1985	57	78	94	81	78	77	102	107	84	70	64	66
1986	67	69	74	90	122	208	208	128	82	64	56	58
1987	61	61	56	57	68	80	104	117	109	94	80	81
1988	87	86	81	85	105	122	110	91	79	71	67	70
1989	73	70	63	62	69	75	86	82	75	67	63	62
1990	61	59	58	62	76	94	102	88	78	71	66	69
Average	66	69	72	84	110	128	136	110	84	70	63	65

North Bay Aqueduct, 406
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3241	3165	3374	4493	4804	5069	5267	4773	4582	4558	4664	4469
1977	4269	4012	3831	4502	5695	5871	6275	6791	6610	6444	6447	6505
1978	6358	6194	5773	7752	12510	14414	12722	8124	5039	4096	4008	3849
1979	3699	3442	3489	7432	11298	11848	8579	5511	4470	4002	4045	3996
1980	3530	3246	4238	7271	11501	13385	8403	6246	4586	3995	4013	3896
1981	3724	3652	3638	5327	6948	6091	5585	5247	4639	4448	4519	4334
1982	3862	4521	5530	8255	12881	10471	12842	10101	6077	4266	4025	3781
1983	3437	4373	5524	7555	13200	16008	16438	9966	5806	4274	4102	3929
1984	3656	3903	5236	8640	6664	5899	5215	4141	3943	3832	3911	3838
1985	3489	4823	5564	5481	5693	5866	6439	6127	4974	4533	4535	4428
1986	4092	4106	4829	6587	9208	13337	11778	7199	4801	4098	4002	3854
1987	3652	3517	3467	4353	5397	6227	7551	7514	6660	6004	5799	5756
1988	5573	5167	4984	6024	8488	9235	7619	5747	4891	4671	4761	4742
1989	4453	4103	3923	4567	5533	5772	5734	5001	4569	4416	4511	4265
1990	3817	3558	3699	4868	6054	6908	6846	5496	4784	4687	4748	4752
Average	4057	4119	4473	6194	8392	9093	8468	6532	5095	4555	4539	4426

North Bay Aqueduct, 406
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	175	175	178	199	214	218	226	213	199	194	194	191
1977	193	193	191	204	236	246	255	265	249	233	222	222
1978	223	227	224	265	370	495	527	355	231	195	186	184
1979	186	185	185	271	415	470	368	255	208	189	185	186
1980	182	179	200	280	429	527	361	285	214	191	188	185
1981	186	189	188	223	282	251	245	236	207	196	194	192
1982	187	202	227	298	462	402	533	427	270	202	187	184
1983	181	204	242	290	487	610	672	428	257	199	187	186
1984	185	193	225	335	276	246	238	204	190	184	182	182
1985	180	210	239	236	246	245	277	269	218	198	193	193
1986	191	195	212	259	345	527	502	326	225	195	188	184
1987	185	186	185	200	232	255	294	294	258	227	214	213
1988	215	213	212	235	299	343	306	248	212	199	197	199
1989	198	195	193	205	231	244	250	224	201	193	191	189
1990	185	183	187	206	250	287	287	241	209	199	196	198
Average	190	195	206	247	318	358	356	285	223	200	193	193

North Bay Aqueduct, 406
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	53	51	50	55	59	63	73	76	75	70	65	65
1977	69	70	63	63	71	75	82	97	102	100	91	88
1978	93	101	97	111	148	192	217	141	85	63	56	58
1979	62	60	55	87	147	177	136	92	74	61	56	60
1980	58	55	63	96	156	205	134	105	76	61	56	58
1981	62	63	58	67	89	78	82	86	76	68	64	64
1982	63	73	85	108	175	149	230	190	107	67	57	57
1983	57	73	96	103	186	246	292	183	99	65	57	59
1984	60	65	81	135	97	81	81	69	65	58	54	57
1985	57	78	94	81	78	77	102	107	84	70	64	66
1986	67	69	74	90	122	208	208	128	82	64	56	58
1987	61	61	56	57	68	80	104	117	109	94	80	81
1988	87	88	81	85	105	122	110	91	79	71	67	70
1989	73	70	63	62	69	75	86	82	75	67	63	62
1990	61	59	58	62	76	94	102	88	78	71	66	69
Average	66	69	72	84	110	128	136	110	84	70	63	65

North Bay Aqueduct, 406
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3241	3165	3374	4493	4804	5069	5287	4773	4582	4558	4664	4469
1977	4269	4012	3831	4502	5695	5871	6275	6791	6610	6444	6447	6505
1978	6358	6194	5773	7752	12510	14414	12722	8124	5039	4096	4008	3849
1979	3699	3442	3489	7432	11298	11848	8579	5511	4470	4002	4045	3998
1980	3530	3246	4238	7271	11501	13385	8403	6246	4586	3995	4013	3896
1981	3724	3652	3638	5327	6948	6091	5585	5247	4639	4448	4519	4334
1982	3862	4521	5530	8255	12881	10471	12842	10101	6077	4266	4025	3781
1983	3437	4373	5524	7555	13200	16008	16438	9966	5806	4274	4102	3929
1984	3656	3903	5238	8640	6664	5899	5215	4141	3943	3832	3911	3838
1985	3489	4823	5564	5481	5693	5866	6439	6127	4974	4533	4535	4428
1986	4092	4106	4829	6587	9208	13337	11778	7199	4801	4098	4002	3854
1987	3652	3517	3467	4353	5397	6227	7551	7514	6660	6004	5799	5756
1988	5573	5167	4984	6024	8488	9235	7619	5747	4891	4671	4761	4742
1989	4453	4103	3923	4567	5533	5772	5734	5001	4569	4416	4511	4265
1990	3817	3558	3699	4668	6054	6908	6846	5496	4784	4687	4748	4752
Average	4057	4119	4473	6194	8392	9093	8488	6532	5095	4555	4539	4426

Emmaton (434)													
Existing Conditions													
Electrical Conductivity													
Units are in microsiemens/centimeter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	293	295	485	578	674	548	767	990	1244	1602	1668	1731	10,875
1977	3172	3826	3222	1755	969	876	1264	1590	2580	3040	3453	3642	29,389
1978	3075	2767	1391	202	167	164	163	164	241	448	682	574	10,038
1979	1714	2375	2314	298	182	167	185	253	281	517	696	1196	10,180
1980	1958	1111	470	165	162	158	163	176	279	412	542	894	6,490
1981	1767	2359	754	179	165	161	195	542	978	772	1052	1270	10,194
1982	2130	322	156	165	156	164	154	156	161	205	254	187	4,210
1983	158	161	155	164	158	156	156	153	154	158	164	155	1,892
1984	161	155	155	156	159	158	171	332	439	425	479	959	3,749
1985	1694	290	182	411	379	237	450	467	771	734	1166	1360	8,141
1986	2119	1988	937	350	182	155	163	180	294	485	849	1131	8,613
1987	2333	3343	1604	820	477	231	251	562	975	1083	1736	1866	15,281
1988	2018	2295	1199	314	254	561	860	903	1170	1627	2748	2800	16,749
1989	3002	2740	2610	1495	1240	213	169	250	716	894	1541	1464	16,334
1990	2524	3410	2942	1018	594	561	455	674	1052	1431	2367	2600	19,628
76 - 90 AVG	1,875	1,829	1,238	538	393	301	371	493	756	922	1,280	1,455	11,451

Emmaton (434)													
Existing Conditions													
Bromide													
Units are in micrograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	201	202	429	534	649	500	764	1034	1339	1773	1857	1937	11,219
1977	3691	4465	3730	1956	1007	896	1363	1757	2951	3505	4007	4241	33,559
1978	3557	3174	1504	73	38	37	37	39	130	381	664	537	10,171
1979	1917	2717	2641	185	46	39	62	147	181	465	665	1290	10,375
1980	2213	1189	408	41	35	34	37	53	176	338	496	923	5,943
1981	1981	2697	754	54	37	35	75	494	1021	774	1114	1380	10,416
1982	2421	235	35	37	33	37	32	34	38	90	150	71	3,213
1983	37	38	33	37	34	33	33	32	33	35	40	34	419
1984	40	34	33	33	34	34	49	243	372	355	422	1003	2,652
1985	1895	196	61	334	294	120	378	404	772	729	1252	1488	7,923
1986	2408	2246	970	251	37	33	37	56	191	421	622	1210	8,482
1987	2667	3888	1782	830	411	116	139	515	1017	1150	1940	2099	16,554
1988	2285	2616	1287	213	139	511	875	932	1254	1806	3163	3228	18,309
1989	3473	3151	2995	1643	1329	100	48	146	708	923	1705	1615	17,836
1990	2899	3968	3396	1068	548	509	389	656	1113	1570	2703	2987	21,806
76 - 90 AVG	2,112	2,054	1,337	486	311	202	288	436	753	954	1,388	1,603	11,925

Emmaton (434)													
Existing Conditions													
Dissolved Organic Carbon													
Units are in micrograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2343	2422	2793	3123	3583	3130	2700	2725	2940	2965	2834	2641	34,199
1977	2481	2475	2700	3053	3573	3229	2803	2778	2950	3083	3151	2962	35,238
1978	2832	2800	3202	3231	3870	2870	2405	2655	2672	2817	2876	2658	34,888
1979	2487	2395	2628	3342	4098	3035	2549	2577	2617	2789	2806	2653	33,976
1980	2473	2436	2954	2864	3817	2839	2502	2626	2694	2798	2821	2681	33,505
1981	2514	2445	2638	2960	3721	2890	2534	2656	2731	2756	2758	2808	33,411
1982	2468	2432	2871	2981	3684	2878	2139	2555	2438	2699	2712	2535	32,392
1983	2320	2525	2913	2991	3776	2653	2261	2491	2289	2722	2727	2448	32,116
1984	2391	2397	2892	2810	3690	2822	2397	2559	2681	2795	2778	2641	32,853
1985	2411	2454	3008	3098	3662	3204	2770	2668	2732	2758	2766	2625	34,154
1986	2502	2540	3026	3260	3736	2669	2490	2694	2804	2944	2959	2705	34,329
1987	2461	2356	2745	2980	3680	3036	2658	2749	2773	2763	2785	2657	33,643
1988	2515	2493	2891	3099	3716	3379	2733	2621	2729	2802	2820	2709	34,507
1989	2608	2584	2713	3045	3567	2773	2295	2513	2618	2716	2762	2610	32,802
1990	2412	2369	2666	2961	3674	3395	2530	2536	2669	2754	2789	2674	33,429
76 - 90 AVG	2,481	2,475	2,856	3,053	3,723	2,987	2,518	2,627	2,689	2,811	2,823	2,654	33,696

Emmaton (434)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	315	445	988	983	889	579	763	1067	1299	1123	1828	1982	10,875
1,977	3371	4112	3812	1894	1000	894	1319	1788	2896	3152	3549	3837	29,389
1,978	3328	2658	1244	199	169	165	161	162	235	446	450	997	10,038
1,979	2463	2495	1394	321	185	166	182	284	281	409	610	875	10,180
1,980	1707	969	384	166	162	157	161	176	306	443	536	1145	6,490
1,981	2300	2913	1409	279	176	162	264	680	1029	1126	1518	1535	10,194
1,982	2251	303	156	165	156	164	153	155	161	231	298	198	4,210
1,983	159	161	156	164	158	155	153	152	154	157	164	156	1,892
1,984	161	156	155	156	158	157	169	320	394	379	450	809	3,749
1,985	1588	319	181	380	541	353	436	450	796	961	1861	1869	8,141
1,986	2297	1940	909	333	162	155	161	178	292	431	410	832	8,613
1,987	2195	3335	1549	784	468	227	246	582	1018	1368	2173	3027	15,281
1,988	2985	2758	1335	332	275	556	929	1182	1323	1602	2762	3243	16,749
1,989	3453	2741	2509	1498	1276	210	168	256	546	878	1495	1579	16,334
1,990	2621	3557	3123	941	534	530	449	607	1017	1308	2086	2702	19,628
76 - 90 AVG	2,080	1,924	1,287	573	421	309	381	536	783	934	1,346	1,652	11,451

Emmaton (434)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	227	383	1038	1025	910	538	759	1128	1407	1195	2050	2240	11,219
1,977	3922	4810	4442	2123	1044	917	1430	1996	3334	3641	4121	4474	33,559
1,978	3858	3032	1325	70	39	38	36	38	124	377	386	1049	10,171
1,979	2823	2861	1529	211	50	38	60	186	183	337	581	903	10,375
1,980	1910	1017	305	40	35	34	38	55	209	375	489	1227	5,943
1,981	2626	3367	1546	176	51	38	159	663	1084	1201	1677	1700	10,416
1,982	2567	212	35	37	33	37	32	34	38	122	204	85	3,213
1,983	39	38	34	37	34	33	33	32	33	35	42	35	419
1,984	41	34	33	33	34	33	46	228	317	301	387	822	2,652
1,985	1767	231	62	298	489	257	362	385	804	1003	2091	2104	7,923
1,986	2621	2186	935	232	37	33	37	56	190	356	337	849	8,482
1,987	2500	3879	1716	787	401	112	135	541	1069	1492	2467	3502	16,554
1,988	3451	3169	1452	235	161	503	957	1266	1437	1773	3179	3764	18,309
1,989	4019	3155	2874	1647	1372	96	47	153	503	904	1650	1754	17,836
1,990	3016	4147	3616	975	477	472	383	577	1072	1422	2363	3110	21,806
76 - 90 AVG	2,359	2,168	1,396	528	344	212	301	489	787	969	1,468	1,841	11,925

Emmaton (434)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2341	2400	2719	3055	3543	3123	2684	2699	2918	2932	2821	2645	34,199
1,977	2471	2443	2639	3041	3566	3223	2815	2766	2911	3100	3202	3035	35,238
1,978	2935	2929	3218	3210	3901	2877	2367	2623	2668	2850	2811	2650	34,888
1,979	2484	2420	2734	3388	4093	2997	2494	2571	2516	2685	2702	2579	33,976
1,980	2433	2429	2956	2892	3798	2805	2440	2596	2696	2815	2817	2666	33,505
1,981	2481	2400	2764	2936	3869	2856	2493	2591	2710	2778	2802	2631	33,411
1,982	2480	2419	2869	2961	3682	2666	2133	2550	2452	2709	2726	2544	32,392
1,983	2313	2511	2909	2986	3769	2650	2254	2490	2291	2719	2734	2449	32,116
1,984	2380	2392	2890	2806	3680	2607	2389	2577	2632	2722	2711	2600	32,853
1,985	2394	2478	2951	3004	3608	3351	2724	2595	2651	2748	2808	2677	34,154
1,986	2548	2577	3028	3232	3731	2663	2484	2694	2817	2920	2807	2624	34,329
1,987	2433	2345	2746	2948	3667	3030	2602	2697	2771	2800	2875	2737	33,643
1,988	2634	2593	2897	3099	3753	3443	2823	2694	2842	2908	2874	2723	34,507
1,989	2600	2565	2699	3031	3560	2762	2289	2532	2617	2704	2753	2607	32,802
1,990	2407	2349	2644	2951	3665	3342	2492	2508	2616	2723	2775	2660	33,429
76 - 90 AVG	2,469	2,483	2,844	3,037	3,712	2,988	2,499	2,612	2,674	2,808	2,815	2,655	33,696

Emmaton (434)
State Permit
Electrical Conductivity

Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	290	428	959	961	875	571	728	963	1217	947	1938	2081	11,958
1977	3547	4304	3877	2237	1021	887	1269	1692	2821	3142	3559	3847	32,203
1978	3231	2899	1389	198	168	164	162	163	239	419	440	999	10,471
1979	2372	2473	1512	325	185	166	182	256	268	454	622	875	9,690
1980	1505	892	336	163	161	158	162	177	289	433	569	1173	6,018
1981	1817	2404	1277	266	174	162	269	689	1044	1293	1659	1509	12,563
1982	2186	285	155	164	155	163	153	155	160	231	293	191	4,291
1983	158	160	155	164	158	156	156	153	154	158	165	156	1,893
1984	161	154	155	156	159	157	169	321	395	380	449	811	3,467
1985	1317	298	179	393	535	308	427	456	743	968	1924	1765	9,313
1986	2326	2006	868	329	161	155	163	182	282	447	416	820	8,155
1987	2153	3284	1530	774	461	225	243	570	1002	1353	2164	2996	16,755
1988	3260	3210	1425	329	270	551	888	1185	1200	1226	2486	2881	18,911
1989	3276	2768	2493	1478	1197	213	169	254	603	993	1937	1658	17,039
1990	2495	3416	3155	903	513	513	443	643	959	1091	2128	2585	18,844
76 - 90 AVG	2,006	1,932	1,298	589	413	303	372	524	758	902	1,383	1,623	12,105

Emmaton (434)
State Permit
Bromide

Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	197	363	1004	998	893	528	717	1002	1309	984	2184	2380	12,539
1977	4135	5047	4524	2537	1069	909	1369	1882	3245	3630	4134	4487	36,968
1978	3743	3330	1505	70	38	37	36	38	129	345	373	1051	10,695
1979	2714	2835	1671	216	49	38	59	152	167	391	595	903	9,790
1980	1666	924	247	38	35	34	38	55	188	363	529	1261	5,378
1981	2042	2752	1387	160	49	37	165	674	1102	1403	1846	1668	13,285
1982	2489	191	34	37	33	37	32	34	38	122	197	76	3,320
1983	38	37	33	37	34	33	33	32	33	35	42	34	421
1984	41	33	33	33	34	34	46	229	318	301	386	825	2,313
1985	1440	205	59	312	481	204	351	392	739	1012	2167	1977	9,339
1986	2657	2267	866	227	37	33	37	57	176	375	343	835	7,930
1987	2449	3817	1693	774	393	110	131	527	1050	1475	2456	3465	18,340
1988	3785	3721	1561	231	155	496	908	1270	1290	1322	2847	3326	20,912
1989	3805	3189	2856	1623	1278	101	48	151	571	1042	2184	1848	18,696
1990	2864	3977	3655	929	451	452	375	619	1002	1161	2415	2969	20,869
76 - 90 AVG	2,271	2,179	1,410	548	335	206	290	474	757	931	1,513	1,806	12,720

Emmaton (434)
State Permit
Dissolved Organic Carbon

Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2339	2400	2722	3055	3543	3124	2659	2679	2865	2868	2794	2648	33,696
1977	2444	2390	2606	3073	3601	3229	2798	2742	2886	3074	3183	3023	35,049
1978	2897	2830	3185	3177	3899	2868	2389	2623	2865	2830	2792	2646	34,781
1979	2473	2406	2719	3399	4086	2996	2495	2563	2514	2692	2708	2580	33,631
1980	2422	2422	2957	2878	3799	2807	2444	2598	2697	2807	2812	2664	33,307
1981	2466	2404	2772	2924	3868	2858	2507	2594	2723	2801	2839	2650	33,206
1982	2492	2410	2868	2966	3671	2867	2131	2532	2431	2701	2720	2529	32,318
1983	2305	2512	2909	2987	3772	2649	2254	2490	2291	2719	2734	2446	32,068
1984	2378	2392	2890	2806	3679	2805	2389	2578	2632	2722	2710	2600	32,581
1985	2380	2472	2950	3034	3622	3262	2711	2615	2675	2756	2810	2672	33,959
1986	2534	2565	3028	3238	3730	2661	2491	2706	2821	2944	2824	2629	34,171
1987	2437	2349	2747	2949	3668	3031	2593	2687	2757	2788	2861	2726	33,593
1988	2589	2524	2878	3068	3754	3448	2788	2671	2764	2801	2817	2718	34,840
1989	2583	2541	2695	3031	3561	2759	2291	2535	2633	2712	2768	2625	32,734
1990	2412	2346	2625	2949	3669	3351	2518	2529	2609	2707	2761	2661	33,137
76 - 90 AVG	2,477	2,464	2,837	3,037	3,715	2,981	2,496	2,609	2,664	2,795	2,809	2,654	33,538

Emmaton (434)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	284	439	1027	1012	889	572	750	1006	1255	1094	1888	2092	12,308
1977	3409	4077	3794	1905	991	879	1262	1763	2886	3168	3567	3842	31,543
1978	3335	2659	1241	199	168	164	182	163	234	454	447	994	10,220
1979	2443	2465	1313	345	187	166	181	284	281	416	612	874	9,567
1980	1739	974	385	164	162	158	162	177	292	488	493	1104	6,298
1981	2386	3155	1473	327	186	164	259	683	1009	1120	1523	1413	13,698
1982	2107	298	156	165	156	164	153	156	163	250	339	213	4,320
1983	160	160	155	164	158	156	156	153	154	158	165	156	1,895
1984	161	154	155	156	159	157	169	321	394	380	449	808	3,463
1985	1620	349	192	374	540	355	429	444	780	1070	1969	1878	10,000
1986	2334	1994	914	293	160	155	163	181	282	437	415	819	8,147
1987	2161	3298	1531	774	462	225	249	587	1032	1410	2235	2926	16,890
1988	2692	2445	1234	315	267	552	948	1163	1316	1613	2788	3231	18,564
1989	3464	2771	2509	1486	1265	209	168	254	552	885	1501	1575	16,639
1990	2608	3508	3078	935	527	525	443	656	1040	1452	2402	2921	20,095
76 - 90 AVG	2,060	1,916	1,277	574	418	307	377	533	778	960	1,386	1,656	12,243

Emmaton (434)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	190	377	1086	1060	910	530	744	1054	1352	1159	2123	2373	12,958
1977	3967	4769	4421	2136	1033	900	1361	1968	3323	3661	4143	4481	36,163
1978	3867	3034	1322	70	38	37	36	39	123	386	381	1045	10,378
1979	2798	2825	1432	239	51	38	58	186	183	346	583	901	9,640
1980	1949	1023	305	39	36	34	38	55	193	428	437	1178	5,715
1981	2730	3662	1624	233	63	40	153	666	1059	1193	1682	1552	14,657
1982	2393	206	35	37	33	37	32	34	40	143	253	103	3,346
1983	40	37	33	37	34	33	33	32	33	35	42	34	423
1984	41	33	33	33	34	34	47	229	318	301	387	821	2,311
1985	1806	267	73	290	486	260	353	378	785	1134	2221	2114	10,169
1986	2667	2252	942	185	36	33	37	57	176	363	343	834	7,925
1987	2459	3834	1694	775	394	110	136	546	1083	1542	2541	3379	18,493
1988	3096	2789	1327	214	152	497	979	1243	1427	1786	3209	3748	20,467
1989	4032	3191	2874	1633	1359	95	47	150	509	912	1657	1749	18,208
1990	3001	4088	3561	967	469	467	375	635	1099	1596	2745	3376	22,379
76 - 90 AVG	2,336	2,159	1,384	530	342	210	295	485	780	999	1,516	1,846	12,882

Emmaton (434)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2337	2400	2713	3070	3551	3124	2686	2708	2939	2943	2825	2650	33,946
1977	2477	2450	2643	3046	3569	3224	2788	2735	2892	3085	3193	3029	35,131
1978	2932	2929	3216	3208	3901	2881	2367	2629	2671	2866	2824	2653	35,077
1979	2486	2423	2742	3433	4109	2998	2489	2571	2517	2684	2702	2579	33,733
1980	2434	2430	2956	2893	3810	2805	2441	2596	2697	2856	2843	2669	33,430
1981	2468	2372	2757	2955	3668	2863	2500	2604	2729	2783	2804	2632	33,135
1982	2476	2417	2870	2982	3682	2874	2135	2550	2488	2728	2746	2553	32,501
1983	2320	2515	2909	2994	3774	2650	2258	2490	2291	2719	2734	2447	32,101
1984	2378	2393	2890	2811	3680	2815	2391	2578	2631	2721	2711	2600	32,599
1985	2397	2494	3019	3030	3610	3362	2726	2801	2659	2751	2815	2683	34,147
1986	2552	2581	3030	3187	3729	2663	2484	2694	2819	2929	2812	2627	34,107
1987	2436	2349	2747	2949	3668	3031	2653	2761	2845	2854	2933	2789	34,015
1988	2685	2660	2922	3091	3756	3457	2872	2736	2880	2941	2899	2739	35,638
1989	2613	2580	2708	3035	3563	2763	2289	2532	2617	2703	2753	2608	32,764
1990	2410	2358	2652	2954	3664	3339	2492	2515	2648	2742	2783	2667	33,224
76 - 90 AVG	2,493	2,490	2,852	3,043	3,716	2,990	2,505	2,620	2,688	2,820	2,825	2,662	33,703

Emmaton (434)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	340	442	974	971	878	568	764	1094	1297	1117	1999	2024	12,468
1977	3085	3494	2620	1571	945	867	1309	1730	2806	3126	3565	3915	29,033
1978	3333	2829	1337	203	168	164	162	163	230	448	455	1013	10,505
1979	2401	2469	1315	345	188	166	180	283	280	471	611	864	9,573
1980	1833	1015	390	164	162	157	162	176	305	471	490	1112	6,437
1981	2364	3162	1475	337	188	164	258	681	1111	1353	1479	1428	14,000
1982	2173	289	156	165	156	163	153	156	163	247	336	213	4,370
1983	164	160	155	164	158	156	156	153	154	158	165	156	1,899
1984	162	154	155	156	159	157	169	321	401	383	448	806	3,471
1985	1554	346	194	383	542	359	430	450	776	1313	1830	1791	9,968
1986	2052	1674	849	357	162	155	163	181	294	447	415	837	7,586
1987	2164	3283	1529	774	461	225	252	602	1047	1461	2101	2981	16,880
1988	2647	2756	1371	333	275	588	918	1215	1242	1364	2582	2989	18,260
1989	3246	2723	2512	1489	1196	214	169	252	704	1337	1927	1657	17,426
1990	2535	3477	3020	905	523	517	452	573	1029	1066	1895	2293	18,285
76 - 90 AVG	2,004	1,885	1,203	554	411	308	380	535	789	984	1,352	1,605	12,011

Emmaton (434)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	258	380	1022	1010	896	524	761	1160	1403	1187	2257	2291	13,149
1977	3573	4059	2999	1733	978	885	1418	1927	3225	3609	4141	4569	33,116
1978	3863	3240	1437	73	38	37	36	39	117	379	391	1068	10,718
1979	2748	2830	1434	239	51	38	57	184	183	411	581	889	9,645
1980	2062	1073	312	39	35	34	38	55	209	407	433	1187	5,884
1981	2704	3670	1627	245	66	40	152	663	1181	1473	1627	1570	15,018
1982	2473	196	34	37	33	37	32	34	40	141	249	102	3,408
1983	45	37	33	37	34	33	33	32	33	35	42	35	429
1984	42	33	33	33	34	34	46	229	326	305	385	819	2,319
1985	1726	263	76	300	490	264	353	385	779	1427	2052	2008	10,123
1986	2325	1866	864	261	38	33	37	57	191	375	342	856	7,245
1987	2463	3816	1692	775	393	110	140	562	1100	1601	2377	3446	18,475
1988	3043	3171	1496	236	160	538	940	1303	1335	1485	2938	3456	20,101
1989	3789	3134	2678	1637	1277	101	47	149	693	1456	2170	1847	19,158
1990	2912	4050	3492	932	464	457	384	535	1086	1130	2133	2616	20,191
76 - 90 AVG	2,267	2,121	1,295	506	332	211	298	488	793	1,028	1,475	1,784	12,599

Emmaton (434)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2343	2401	2720	3057	3546	3121	2702	2727	2970	2969	2835	2657	34,047
1977	2522	2555	2779	3056	3571	3224	2826	2783	2931	3107	3201	3045	35,602
1978	2949	2921	3228	3239	3900	2883	2367	2629	2670	2866	2823	2650	35,125
1979	2480	2413	2740	3433	4114	2995	2481	2568	2517	2695	2713	2581	33,730
1980	2435	2432	2957	2878	3807	2792	2428	2584	2686	2838	2823	2656	33,316
1981	2452	2357	2748	2964	3671	2862	2497	2602	2799	2891	2879	2657	33,379
1982	2493	2413	2869	2981	3682	2866	2134	2550	2488	2731	2749	2553	32,509
1983	2348	2516	2906	2969	3773	2649	2255	2490	2292	2719	2734	2450	32,123
1984	2382	2392	2890	2806	3680	2807	2389	2577	2631	2721	2711	2600	32,586
1985	2395	2495	3022	3040	3613	3370	2728	2617	2692	2790	2861	2683	34,306
1986	2548	2566	3021	3258	3732	2664	2486	2699	2818	2946	2826	2628	34,192
1987	2435	2349	2747	2949	3668	3031	2681	2812	2910	2916	2967	2756	34,221
1988	2633	2549	2879	3096	3758	3588	2977	2811	2919	2903	2854	2716	35,683
1989	2586	2545	2695	3033	3562	2761	2289	2524	2639	2747	2847	2653	32,881
1990	2423	2353	2648	2951	3668	3352	2593	2563	2666	2756	2782	2663	33,418
76 - 90 AVG	2,495	2,484	2,857	3,049	3,716	2,998	2,522	2,636	2,709	2,840	2,840	2,663	33,808

Emmaton (434)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	713	720	1065	848	842	646	791	1117	1246	1638	2711	2505	14,842
1977	2993	3163	2679	1643	954	1039	1276	1657	2736	3088	3538	3854	28,620
1978	3308	2766	1310	203	173	165	162	164	229	445	499	1038	10,462
1979	2466	2574	1595	327	186	166	180	335	305	485	650	1108	10,377
1980	2043	1157	444	165	162	158	162	179	311	506	537	1128	6,952
1981	2255	2950	1389	358	194	164	257	731	1174	1404	1876	1600	14,352
1982	2215	290	156	165	156	164	153	156	163	282	416	231	4,547
1983	172	160	155	164	158	156	156	153	154	160	169	168	1,925
1984	180	155	155	156	159	157	169	321	394	385	449	800	3,480
1985	2021	397	203	385	550	376	438	463	859	1311	2056	2012	11,071
1986	2337	1882	889	358	162	155	163	181	293	473	421	829	8,143
1987	2163	3278	1528	773	462	225	260	613	1191	1532	2418	3247	17,690
1988	2752	2140	1105	317	275	640	867	1217	1312	1685	2936	3300	18,546
1989	3116	2505	2474	1505	1255	210	167	265	770	1291	1999	1675	17,232
1990	2522	3478	3066	909	522	516	457	795	1097	1547	2599	2830	20,338
76 - 90 AVG	2,084	1,841	1,214	552	414	329	377	556	816	1,082	1,552	1,755	12,572

Emmaton (434)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	708	716	1132	863	854	618	792	1186	1340	1815	3116	2871	16,011
1977	3462	3658	3069	1818	988	1092	1378	1838	3141	3563	4108	4498	32,611
1978	3834	3166	1407	73	40	37	36	39	116	375	443	1098	10,664
1979	2826	2956	1770	218	50	38	58	247	211	428	628	1184	10,614
1980	2316	1244	377	40	36	34	37	57	215	448	488	1207	6,499
1981	2571	3412	1522	268	72	40	150	723	1253	1529	2105	1778	15,423
1982	2523	196	34	37	33	37	32	34	40	182	345	125	3,618
1983	54	38	33	37	34	33	33	32	33	37	48	47	457
1984	63	34	33	33	34	34	47	229	317	308	386	811	2,329
1985	2291	325	86	303	499	284	362	399	875	1420	2324	2275	11,443
1986	2689	2112	911	262	38	33	37	57	189	405	349	846	7,908
1987	2462	3810	1691	774	394	109	148	571	1266	1677	2752	3761	19,415
1988	3181	2404	1165	216	160	598	876	1305	1419	1870	3386	3830	20,390
1989	3610	2869	2832	1656	1347	97	46	162	769	1399	2256	1868	18,911
1990	2896	4051	3547	936	462	456	390	800	1165	1710	2983	3264	22,660
76 - 90 AVG	2,363	2,066	1,307	502	338	236	295	512	823	1,144	1,714	1,964	13,264

Emmaton (434)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2385	2402	2718	3004	3513	3168	2725	2755	2974	3004	2910	2707	34,265
1977	2574	2594	2779	3090	3585	3311	2825	2760	2929	3107	3201	3032	35,787
1978	2924	2896	3208	3264	3979	2894	2367	2634	2674	2868	2865	2669	35,242
1979	2490	2429	2724	3401	4101	2994	2483	2580	2541	2716	2749	2622	33,830
1980	2464	2437	2956	2891	3811	2807	2442	2606	2717	2885	2886	2682	33,584
1981	2503	2424	2780	2999	3679	2866	2485	2612	2935	3062	2984	2697	34,026
1982	2507	2413	2871	2986	3686	2878	2138	2553	2490	2752	2790	2562	32,626
1983	2372	2519	2907	3003	3778	2653	2259	2496	2297	2766	2735	2566	32,351
1984	2443	2399	2894	2814	3680	2815	2391	2578	2631	2721	2711	2601	32,678
1985	2406	2505	3027	3032	3609	3400	2777	2680	2899	2974	2938	2724	34,971
1986	2604	2648	3049	3264	3735	2664	2487	2700	2818	2957	2836	2630	34,392
1987	2436	2349	2747	2949	3668	3032	2755	2909	3140	3207	3231	3023	35,446
1988	2886	2869	2995	3109	3766	3764	3048	2806	2955	3011	2985	2819	37,013
1989	2665	2587	2704	3040	3568	2768	2286	2563	2836	2905	2885	2662	33,469
1990	2425	2352	2643	2952	3669	3355	2632	2617	2736	2779	2800	2681	33,641
76 - 90 AVG	2,539	2,522	2,867	3,053	3,722	3,025	2,540	2,657	2,771	2,914	2,900	2,712	34,221

Emmaton, 434
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	536	538	731	746	790	453	634	811	1182	1895	1431	1791
1977	2753	3234	3308	1974	1153	643	1078	1735	2013	2633	3321	3747
1978	3249	2887	1248	200	170	164	163	187	226	356	460	908
1979	2324	2353	1076	397	196	167	166	185	217	431	792	1153
1980	1739	1277	469	171	162	158	162	170	224	361	426	1138
1981	2268	3110	1204	499	217	172	175	288	811	1452	1378	1474
1982	2165	315	156	165	156	164	154	157	165	272	484	303
1983	170	160	155	164	158	156	156	153	154	158	177	159
1984	161	154	155	156	158	158	164	176	251	321	434	798
1985	1505	353	191	394	448	289	309	305	695	1361	1690	1710
1986	2367	1899	635	333	161	156	164	176	249	299	432	854
1987	1986	3060	1253	845	452	221	263	548	1131	1510	2343	3090
1988	2505	2525	941	332	261	310	568	855	1219	1885	2853	2751
1989	2654	2374	2254	1394	1156	220	164	255	725	1324	2083	1679
1990	2040	2726	2528	738	439	328	355	547	1007	1848	2430	2578
Average	1895	1798	1087	567	405	251	312	435	685	1074	1382	1609

Emmaton, 434
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	495	497	730	741	792	387	603	817	1260	2118	1566	2009
1977	3171	3741	3824	2212	1224	613	1139	1934	2269	3020	3851	4369
1978	3767	3318	1336	70	39	37	37	39	107	272	399	942
1979	2656	2690	1147	304	58	38	39	58	101	362	800	1238
1980	1948	1390	409	47	36	34	36	42	105	275	358	1220
1981	2588	3607	1302	439	101	48	52	186	810	1580	1500	1624
1982	2462	227	35	37	33	38	32	34	41	170	428	211
1983	51	37	33	36	34	33	33	32	33	35	57	38
1984	40	33	33	33	34	34	40	52	142	231	368	810
1985	1666	272	74	315	378	182	206	205	674	1480	1881	1910
1986	2705	2137	608	233	37	33	38	45	129	201	365	877
1987	2248	3547	1361	862	382	105	150	489	1190	1651	2683	3574
1988	2868	2885	977	234	146	203	511	865	1304	2108	3283	3166
1989	3051	2708	2565	1522	1229	108	42	151	717	1440	2359	1874
1990	2313	3142	2900	731	363	232	266	499	1054	2071	2776	2960
Average	2135	2015	1156	521	326	142	215	383	662	1134	1510	1788

Emmaton, 434
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2354	2365	2736	2963	3500	3034	2682	2756	3024	3154	2969	2677
1977	2573	2602	2759	3140	3610	3221	2797	2725	2803	2846	3017	2902
1978	2823	2783	3164	3254	3929	2871	2430	2719	2723	2752	2710	2603
1979	2448	2405	2742	3366	4205	3040	2481	2722	2606	2700	2744	2622
1980	2450	2424	2913	2888	3814	2819	2466	2687	2741	2786	2735	2636
1981	2450	2355	2752	2982	3675	2927	2450	2672	2985	3159	3054	2697
1982	2489	2425	2869	2987	3676	2897	2147	2568	2508	2714	2745	2563
1983	2367	2515	2905	2981	3770	2652	2257	2493	2282	2696	2728	2455
1984	2393	2385	2890	2812	3689	2847	2421	2629	2660	2711	2703	2593
1985	2386	2494	2955	3012	3622	3268	2809	2748	2878	2926	2939	2704
1986	2550	2570	2967	3202	3730	2672	2532	2833	2895	2786	2713	2603
1987	2426	2341	2737	2930	3668	3017	2803	2936	3118	3172	3163	2925
1988	2755	2650	2883	3073	3732	3546	3058	2832	2974	3077	3073	2825
1989	2647	2577	2721	3039	3563	2773	2275	2558	2717	2789	2859	2663
1990	2419	2357	2648	2940	3662	3169	2659	2686	2812	2857	2903	2714
Average	2502	2483	2843	3038	3723	2984	2551	2704	2782	2875	2870	2679

SJR @ Jersey Point (49)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	324	212	297	889	1169	996	645	722	572	844	1321	1379	9,370
1977	1507	1674	1553	2311	2187	1259	875	885	1086	1325	1623	1932	18,217
1978	1503	1234	992	329	222	224	209	190	198	244	496	553	6,394
1979	999	1549	1362	612	256	208	196	281	227	291	689	1013	7,683
1980	1371	1284	656	207	198	186	180	187	200	260	442	690	5,861
1981	1006	1237	714	240	197	185	195	369	587	869	1059	1313	7,971
1982	1313	916	205	213	182	198	172	171	173	198	277	193	4,211
1983	163	185	179	211	192	184	171	163	170	182	177	168	2,145
1984	168	177	176	182	187	182	187	336	305	299	492	851	3,542
1985	1581	1048	232	703	877	378	384	457	454	831	1053	1348	9,346
1986	1303	1202	988	789	226	182	180	188	202	243	445	894	6,842
1987	1605	1890	1752	2070	1328	507	256	398	605	860	1215	1543	14,029
1988	1170	920	1041	876	343	563	839	1011	680	871	1555	1891	11,760
1989	1385	1351	1288	2240	1515	530	213	374	507	814	1098	1318	12,633
1990	1433	1620	1558	2623	1217	673	795	640	564	878	1459	1833	15,293
76 - 90 AVG	1,122	1,100	866	966	686	430	366	425	435	601	893	1,128	9,020

SJR @ Jersey Point (49)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	235	98	197	904	1236	1030	607	698	517	849	1431	1507	9,309
1977	1659	1850	1699	2619	2468	1348	883	891	1131	1421	1786	2167	19,922
1978	1647	1302	1009	190	63	64	59	52	70	128	433	507	5,524
1979	1048	1714	1484	548	88	59	61	172	112	186	668	1065	7,205
1980	1500	1396	631	73	55	47	45	54	75	149	369	673	5,067
1981	1056	1334	700	117	53	46	62	274	541	886	1117	1428	7,614
1982	1428	948	86	62	48	57	43	42	45	75	172	76	3,082
1983	41	54	51	64	52	50	42	38	42	48	47	43	572
1984	44	48	49	47	47	46	57	240	204	197	432	869	2,280
1985	1755	1108	116	682	884	275	286	381	380	839	1110	1469	9,285
1986	1416	1289	1025	774	88	49	47	53	73	120	369	919	6,222
1987	1783	2125	1956	2337	1427	431	131	304	560	874	1305	1705	14,938
1988	1256	945	1089	885	234	501	840	1053	655	886	1714	2124	12,182
1989	1511	1461	1389	2538	1650	466	92	288	450	820	1165	1434	13,264
1990	1575	1795	1714	3004	1294	631	788	608	518	896	1600	2054	16,477
76 - 91 AVG	1,197	1,164	880	990	646	340	270	343	358	558	915	1,203	8,863

SJR @ Jersey Point (49)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2481	2496	2855	3313	3634	3548	3074	3033	3257	3234	3046	2798	36,769
1977	2742	2806	2979	3209	3508	3583	3194	3152	3371	3495	3550	3292	38,881
1978	3111	3076	3401	4476	4838	4533	3749	3184	2915	2996	3089	2827	42,195
1979	2664	2555	2782	3854	5280	4173	3077	2787	2817	2968	3007	2807	38,771
1980	2628	2518	2951	3757	5088	4265	3250	2903	2878	2965	3017	2839	39,059
1981	2695	2633	2905	3367	4002	3618	3026	2928	2985	2927	2921	2751	36,758
1982	2637	2602	3082	4281	4328	4323	3275	2975	2708	2856	2908	2668	38,643
1983	2481	3024	3586	4665	5295	4325	3754	3067	3183	3358	3030	2712	42,440
1984	2573	2829	3671	3865	4203	3585	2817	2712	2884	2974	2977	2790	37,880
1985	2550	2627	3141	3310	3673	3759	3223	2945	2976	2928	2933	2773	36,838
1986	2679	2710	3109	3539	4902	4115	3269	3004	2998	3165	3199	2873	39,562
1987	2639	2572	2783	3049	3635	3672	3169	3102	3051	2940	2976	2826	36,414
1988	2703	2719	2993	3319	3789	3800	3146	2846	2959	3027	3087	2934	37,322
1989	2879	2843	2936	3171	3691	3392	2680	2622	2804	2863	2938	2755	35,574
1990	2605	2631	2897	2992	3608	3830	3009	2698	2874	2948	3018	2879	35,989
76 - 90 AVG	2,670	2,709	3,070	3,611	4,232	3,901	3,181	2,931	2,977	3,043	3,046	2,835	38,206

SJR @ Jersey Point (49)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	362	333	842	1874	1636	1079	672	821	617	766	1203	1536	9,370
1,977	1645	1872	1755	2560	2281	1296	878	1032	1237	1379	1622	1951	18,217
1,978	1570	1238	986	329	241	240	198	181	192	231	514	793	6,394
1,979	1356	1639	1541	788	268	202	192	293	286	427	854	1114	7,683
1,980	1251	1146	529	232	204	177	172	182	204	258	484	893	5,861
1,981	1414	1684	1684	808	259	196	265	502	610	847	1209	1490	7,971
1,982	1387	867	201	220	192	198	168	166	171	216	322	205	4,211
1,983	162	184	183	211	177	157	144	159	168	176	174	168	2,145
1,984	165	197	185	179	180	175	180	278	315	407	593	878	3,542
1,985	1491	1110	291	823	1102	528	505	658	559	825	1157	1532	9,346
1,986	1300	1159	1012	777	280	183	171	181	201	243	471	807	6,842
1,987	1483	1828	1826	2212	1332	493	264	404	590	732	1127	1772	14,029
1,988	1422	1169	1331	969	323	548	719	894	647	799	1482	2040	11,760
1,989	1674	1486	1324	2293	1504	509	211	296	422	753	1136	1328	12,633
1,990	1514	1728	1657	2512	1162	680	860	758	638	899	1367	1802	15,293
76 - 90 AVG	1,213	1,176	1,023	1,119	743	444	373	454	457	597	914	1,221	9,020

SJR @ Jersey Point (49)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	282	246	858	2097	1802	1130	639	819	573	756	1290	1697	9,309
1,977	1825	2086	1942	2919	2582	1393	887	1070	1317	1486	1782	2188	19,922
1,978	1719	1293	999	190	73	73	54	48	65	112	456	797	5,524
1,979	1478	1821	1703	764	108	55	60	187	184	353	870	1188	7,205
1,980	1356	1229	477	81	57	46	43	53	80	145	420	919	5,067
1,981	1550	1876	1876	807	137	66	151	439	570	858	1298	1642	7,614
1,982	1518	889	82	65	52	56	43	40	44	98	227	90	3,082
1,983	40	53	52	64	53	50	42	38	42	46	46	44	572
1,984	43	59	52	47	44	42	51	169	216	327	555	902	2,280
1,985	1647	1183	188	829	1156	455	431	627	511	833	1234	1691	9,285
1,986	1411	1235	1054	761	115	54	45	51	71	122	403	816	6,222
1,987	1636	2050	2046	2511	1433	414	141	315	543	718	1196	1978	14,938
1,988	1554	1237	1439	997	206	479	691	908	611	795	1624	2304	12,182
1,989	1860	1629	1434	2603	1636	441	90	193	346	747	1211	1447	13,264
1,990	1673	1927	1834	2869	1228	642	869	752	608	922	1489	2017	16,477
76 - 90 AVG	1,306	1,254	1,069	1,174	712	360	282	381	385	555	940	1,315	8,863

SJR @ Jersey Point (49)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2484	2469	2755	3149	3547	3536	3063	2993	3234	3182	3027	2813	36,769
1,977	2739	2780	2963	3194	3491	3574	3207	3138	3342	3530	3627	3395	38,881
1,978	3252	3214	3410	4463	5140	4558	3547	3064	2901	3046	3058	2802	42,195
1,979	2702	2598	2757	3774	4985	4024	2966	2765	2739	2811	2855	2704	38,771
1,980	2572	2507	2962	3815	4912	3985	3048	2828	2883	2989	3023	2824	39,059
1,981	2675	2599	2789	3201	3701	3421	2860	2800	2954	2971	2995	2789	36,758
1,982	2655	2609	3074	4295	4313	4233	3237	2948	2721	2868	2917	2679	38,643
1,983	2431	2920	3534	4654	5289	4310	3732	3061	3185	3325	3026	2699	42,440
1,984	2533	2804	3664	3837	4151	3506	2781	2755	2858	2876	2885	2734	37,880
1,985	2527	2623	3037	3173	3558	3845	3247	2818	2863	2919	3020	2859	36,838
1,986	2744	2753	3108	3513	4845	4083	3255	3007	3017	3133	3056	2767	39,562
1,987	2603	2566	2769	2993	3601	3667	3106	3000	3041	3011	3129	2993	36,414
1,988	2906	2862	2991	3308	3906	3945	3253	2986	3117	3160	3155	2975	37,322
1,989	2893	2810	2902	3145	3694	3392	2674	2665	2822	2848	2924	2751	35,574
1,990	2602	2613	2885	2996	3574	3769	2958	2635	2803	2898	2984	2871	35,989
76 - 90 AVG	2,688	2,715	3,040	3,567	4,180	3,857	3,129	2,898	2,965	3,038	3,045	2,844	38,206

SJR @ JP

SJR @ Jersey Point (49)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	328	321	827	1851	1609	1060	695	815	612	758	1177	1568	11,621
1977	1892	2144	1831	2297	2269	1296	893	1027	1212	1374	1626	1967	19,828
1978	1578	1343	1105	333	236	226	199	184	194	237	503	792	6,930
1979	1418	1662	1449	778	266	200	191	286	272	411	870	1120	8,923
1980	1248	1068	467	198	196	181	175	185	202	261	508	926	5,615
1981	1423	1361	1463	762	249	191	276	518	594	791	1194	1435	10,257
1982	1328	812	196	213	182	197	172	170	173	215	317	200	4,175
1983	161	177	175	211	192	184	171	162	169	180	177	169	2,128
1984	165	175	176	182	185	179	181	279	316	407	594	881	3,720
1985	1506	1036	280	756	1074	521	468	553	496	804	1183	1547	10,224
1986	1341	1231	987	752	224	183	181	190	202	239	474	801	6,805
1987	1471	1816	1805	2178	1310	485	264	409	598	750	1146	1781	14,013
1988	1638	1484	1522	970	314	542	773	905	672	784	1312	1841	12,757
1989	1588	1518	1338	2275	1623	557	215	287	424	784	1222	1432	13,263
1990	1515	1759	1652	2418	1054	648	777	668	657	895	1316	1813	15,172
76 - 90 AVG	1,240	1,194	1,018	1,078	732	443	375	443	453	593	908	1,218	9,695

SJR @ Jersey Point (49)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	240	231	641	2070	1770	1107	667	813	568	749	1259	1735	12,050
1977	2127	2424	2038	2600	2565	1393	904	1066	1288	1481	1788	2207	21,881
1978	1732	1431	1149	196	70	66	54	49	67	120	443	797	6,174
1979	1554	1850	1591	752	108	55	60	179	167	333	889	1196	8,734
1980	1352	1136	403	62	54	46	44	54	78	149	449	958	4,785
1981	1562	1486	1607	752	125	59	163	458	551	769	1278	1575	10,405
1982	1446	822	76	62	48	56	43	41	45	96	221	85	3,041
1983	40	50	49	64	52	50	42	38	42	48	47	44	566
1984	43	47	49	47	46	44	52	169	216	328	556	906	2,503
1985	1666	1093	175	747	1122	447	387	499	434	807	1266	1709	10,352
1986	1461	1323	1025	730	85	50	47	54	71	116	406	809	6,177
1987	1621	2036	2021	2469	1406	404	142	320	554	739	1219	1990	14,921
1988	1815	1624	1673	1000	195	472	757	923	644	781	1421	2063	13,368
1989	1758	1669	1452	2582	1782	501	95	182	348	784	1314	1572	14,039
1990	1674	1967	1830	2757	1097	603	768	643	631	918	1427	2031	16,346
76 - 90 AVG	1,339	1,279	1,065	1,126	702	357	282	366	380	549	932	1,312	9,689

SJR @ Jersey Point (49)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2481	2469	2755	3149	3547	3539	3040	2951	3159	3091	3002	2622	36,005
1977	2704	2708	2924	3281	3569	3590	3187	3093	3303	3499	3606	3384	38,848
1978	3196	3109	3371	4449	5133	4557	3547	3063	2901	3015	3022	2797	42,160
1979	2679	2576	2767	3786	4986	4020	2966	2757	2732	2825	2868	2705	37,667
1980	2552	2494	2965	3794	4908	4004	3062	2834	2884	2980	3013	2822	38,312
1981	2633	2582	2802	3197	3697	3448	2899	2803	2968	3015	3052	2816	35,912
1982	2667	2611	3070	4297	4316	4290	3243	2941	2708	2862	2913	2688	38,596
1983	2425	2920	3531	4659	5286	4310	3730	3061	3185	3325	3026	2697	42,155
1984	2531	2804	3664	3838	4150	3505	2782	2756	2859	2876	2885	2734	37,382
1985	2502	2612	3036	3212	3591	3785	3199	2849	2899	2930	3028	2852	36,495
1986	2728	2740	3106	3518	4843	4081	3282	3033	3020	3161	3087	2773	39,372
1987	2605	2566	2770	2997	3603	3667	3096	2979	3021	2994	3109	2977	36,384
1988	2866	2798	2954	3298	3911	3955	3220	2946	3015	2997	3073	2955	37,988
1989	2862	2780	2894	3144	3644	3355	2673	2671	2841	2867	2968	2781	35,480
1990	2597	2589	2867	3002	3596	3788	2988	2682	2804	2859	2972	2865	35,609
76 - 90 AVG	2,669	2,691	3,032	3,575	4,185	3,860	3,126	2,895	2,953	3,020	3,042	2,843	37,890

SJR @ Jersey Point (49)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	324	323	795	1819	1628	1067	662	759	579	761	1208	1573	11,498
1977	1669	1856	1745	2524	2254	1278	903	1035	1233	1389	1634	1964	19,484
1978	1577	1237	993	330	236	226	199	184	193	230	514	791	6,710
1979	1348	1621	1562	828	275	201	191	290	286	436	859	1111	9,008
1980	1251	1164	531	203	196	180	175	185	203	241	484	862	5,675
1981	1564	1929	1793	1007	311	204	261	454	581	841	1199	1422	11,566
1982	1327	860	201	213	182	195	171	170	174	220	358	220	4,291
1983	162	177	175	211	193	184	171	162	169	180	177	169	2,130
1984	165	175	176	182	185	179	181	280	316	407	593	876	3,715
1985	1489	1182	257	815	1092	523	500	614	536	842	1211	1547	10,608
1986	1313	1187	1022	694	217	163	180	189	202	241	475	800	6,703
1987	1483	1808	1804	2180	1311	485	252	368	537	675	1061	1682	13,626
1988	1242	960	1185	901	305	537	655	829	620	778	1451	2027	11,490
1989	1655	1483	1326	2265	1478	501	211	293	421	758	1143	1327	12,861
1990	1496	1686	1621	2485	1170	679	847	702	590	886	1482	1939	15,583
76 - 90 AVG	1,203	1,177	1,012	1,110	736	441	371	434	443	592	923	1,221	9,663

SJR @ Jersey Point (49)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	236	234	802	2031	1792	1115	627	743	527	749	1296	1742	11,894
1977	1855	2071	1931	2875	2549	1371	917	1076	1313	1500	1797	2203	21,458
1978	1727	1294	1008	192	70	66	54	50	65	109	455	795	5,885
1979	1468	1798	1728	812	117	55	59	183	183	364	877	1185	8,829
1980	1356	1251	480	67	54	46	44	54	78	123	418	881	4,852
1981	1733	2173	2007	1048	201	76	145	380	534	851	1285	1559	11,992
1982	1446	881	81	62	48	55	43	41	46	100	270	108	3,181
1983	41	50	49	64	53	50	42	38	42	48	47	44	568
1984	43	47	49	47	46	44	52	170	217	328	555	900	2,498
1985	1645	1270	146	818	1144	448	425	573	483	852	1299	1709	10,812
1986	1425	1268	1066	662	78	50	47	54	71	119	408	807	6,055
1987	1612	2027	2020	2471	1407	404	127	267	476	647	1115	1869	14,442
1988	1333	978	1260	916	184	464	613	827	577	769	1587	2287	11,795
1989	1837	1624	1436	2569	1604	431	89	189	345	753	1219	1445	13,541
1990	1651	1876	1791	2838	1238	640	853	685	549	906	1627	2182	16,836
76 - 90 AVG	1,294	1,256	1,057	1,165	706	354	276	355	367	548	950	1,314	9,643

SJR @ Jersey Point (49)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2480	2469	2763	3172	3564	3541	3065	3006	3261	3198	3033	2824	36,376
1977	2746	2785	2967	3205	3501	3577	3176	3087	3317	3515	3618	3390	38,884
1978	3251	3214	3408	4461	5139	4561	3547	3067	2904	3070	3084	2806	42,512
1979	2703	2600	2753	3796	5008	4023	2958	2763	2740	2810	2855	2704	37,713
1980	2574	2508	2962	3817	4913	3986	3048	2828	2883	3047	3080	2828	38,474
1981	2658	2570	2776	3162	3672	3432	2878	2624	2881	2977	2998	2788	35,716
1982	2644	2601	3075	4298	4314	4235	3238	2948	2744	2893	2938	2689	38,615
1983	2438	2924	3514	4661	5292	4310	3734	3061	3185	3325	3026	2697	42,167
1984	2531	2805	3664	3841	4152	3513	2784	2756	2858	2876	2885	2734	37,399
1985	2531	2626	3157	3238	3564	3855	3253	2829	2875	2930	3037	2869	36,764
1986	2751	2762	3112	3491	4838	4082	3255	3006	3019	3142	3064	2769	39,291
1987	2605	2568	2771	2997	3603	3668	3163	3115	3137	3084	3209	3051	36,971
1988	2950	2928	3029	3314	3916	3966	3302	3054	3165	3201	3189	2995	39,009
1989	2908	2831	2912	3153	3702	3397	2674	2665	2822	2848	2923	2751	35,586
1990	2606	2621	2892	3001	3587	3761	2957	2655	2846	2936	3015	2889	35,746
76 - 90 AVG	2,692	2,721	3,050	3,574	4,183	3,860	3,135	2,911	2,982	3,057	3,064	2,852	38,082

SJR @ Jersey Point (49)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	400	334	830	1848	1611	1061	640	759	586	763	1251	1568	11,651
1977	1377	1422	1330	2104	2129	1252	852	986	1197	1365	1627	1952	17,593
1978	1587	1287	1049	339	235	225	199	184	192	228	524	810	6,859
1979	1390	1644	1565	828	275	200	190	288	285	401	850	1099	9,015
1980	1276	1191	538	203	196	180	175	184	204	245	479	869	5,740
1981	1603	1952	1797	1033	325	206	261	456	513	696	1096	1340	11,278
1982	1310	819	198	213	182	195	171	170	174	215	351	220	4,218
1983	163	178	174	212	192	184	171	162	169	180	177	169	2,131
1984	165	175	176	182	185	179	181	279	318	412	592	875	3,719
1985	1482	1168	259	814	1093	523	501	540	484	709	1163	1499	10,235
1986	1229	1046	943	812	229	183	181	189	203	240	471	815	6,541
1987	1484	1816	1805	2179	1311	484	250	345	508	615	1087	1759	13,643
1988	1329	1190	1461	978	320	424	568	712	577	773	1397	1947	11,676
1989	1596	1470	1325	2262	1626	560	214	319	461	660	1127	1363	12,983
1990	1496	1724	1635	2429	1088	653	606	606	571	821	1228	1671	14,528
76 - 90 AVG	1,192	1,161	1,006	1,096	733	434	344	412	429	555	895	1,197	9,454

SJR @ Jersey Point (49)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	328	247	845	2066	1772	1108	600	742	533	750	1347	1736	12,074
1977	1499	1538	1426	2370	2398	1340	854	1014	1268	1469	1789	2188	19,153
1978	1739	1354	1074	201	70	65	54	50	64	107	467	818	6,063
1979	1520	1827	1733	812	117	54	59	182	182	321	866	1170	8,843
1980	1385	1283	488	67	54	45	44	54	80	129	413	889	4,931
1981	1779	2202	2012	1080	217	78	146	382	451	672	1158	1460	11,637
1982	1424	831	78	62	48	55	43	41	46	94	262	107	3,091
1983	42	50	48	64	52	50	42	38	42	48	47	45	568
1984	43	47	49	47	46	44	52	169	219	334	553	898	2,501
1985	1637	1253	148	816	1145	448	425	484	420	690	1240	1651	10,357
1986	1325	1100	972	803	91	50	47	54	73	117	402	825	5,859
1987	1636	2036	2021	2470	1407	403	122	237	438	573	1146	1963	14,452
1988	1441	1266	1599	1009	202	324	503	681	522	763	1522	2191	12,023
1989	1767	1611	1436	2586	1785	504	93	222	393	633	1197	1487	13,694
1990	1652	1923	1809	2770	1138	609	560	567	525	827	1321	1859	15,560
76 - 90 AVG	1,281	1,238	1,049	1,147	703	345	243	328	350	502	915	1,286	9,387

SJR @ Jersey Point (49)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2485	2470	2756	3152	3550	3537	3080	3041	3305	3233	3052	2831	36,492
1977	2792	2891	3018	3213	3505	3577	3217	3161	3361	3536	3627	3415	39,313
1978	3270	3213	3428	4480	5117	4551	3548	3068	2905	3071	3083	2804	42,538
1979	2689	2586	2750	3795	5010	4012	2944	2758	2739	2832	2878	2707	37,700
1980	2579	2513	2962	3817	4907	3981	3041	2819	2876	3024	3055	2816	38,390
1981	2641	2554	2767	3160	3679	3431	2874	2820	3066	3137	3102	2824	36,055
1982	2667	2611	3073	4295	4314	4235	3238	2948	2744	2898	2943	2690	38,656
1983	2456	2928	3505	4664	5281	4310	3732	3062	3185	3325	3026	2699	42,173
1984	2534	2804	3664	3837	4152	3507	2781	2755	2858	2876	2885	2734	37,387
1985	2526	2623	3158	3250	3573	3863	3259	2856	2918	3006	3091	2864	36,987
1986	2729	2724	3096	3523	4848	4084	3265	3018	3019	3164	3090	2772	39,332
1987	2603	2566	2770	2997	3603	3668	3197	3204	3219	3164	3238	3007	37,236
1988	2880	2805	2953	3300	3919	4096	3471	3177	3217	3135	3114	2952	39,019
1989	2861	2784	2898	3150	3646	3356	2672	2647	2837	2952	3077	2818	35,698
1990	2615	2606	2875	3000	3592	3788	3062	2751	2871	2928	2983	2853	35,924
76 - 90 AVG	2,688	2,712	3,045	3,576	4,180	3,866	3,159	2,939	3,008	3,065	3,083	2,852	38,193

SJR @ Jersey Point (49)													
Maximum Flow													
Electrical Conductivity													
Units are in microsiemens/centimeter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	716	575	957	2064	1584	1059	658	702	569	771	1472	1797	12,924
1977	1348	1273	1190	1963	2107	1222	922	954	1140	1345	1612	1956	17,032
1978	1575	1280	1035	339	241	228	199	185	192	228	479	812	6,793
1979	1366	1515	1346	770	267	200	190	297	287	346	763	1032	8,379
1980	1338	1316	619	206	196	181	175	185	207	244	468	877	6,012
1981	1270	1495	1623	1012	351	207	275	405	452	634	1120	1480	10,324
1982	1346	820	198	213	182	196	172	171	175	214	390	238	4,315
1983	165	178	172	211	192	184	171	162	169	176	175	167	2,122
1984	167	175	176	182	185	179	182	279	316	412	598	865	3,716
1985	1500	1315	278	851	1102	523	460	398	361	650	1175	1566	10,179
1986	1202	1033	969	811	229	183	181	189	203	241	479	806	6,526
1987	1482	1818	1805	2177	1310	483	248	344	456	589	961	1608	13,281
1988	1195	800	1006	889	313	353	587	754	580	730	1363	1971	10,541
1989	1515	1322	1267	2225	1485	511	208	225	322	622	1160	1406	12,268
1990	1502	1726	1638	2428	1084	646	545	516	551	879	1535	1964	15,014
76 - 90 AVG	1,179	1,109	952	1,089	722	424	345	384	399	539	917	1,236	9,295

SJR @ Jersey Point (49)													
Maximum Flow													
Bromide													
Units are in micrograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	709	538	998	2330	1741	1106	621	672	512	758	1611	2010	13,606
1977	1462	1356	1256	2196	2370	1301	937	977	1199	1445	1770	2193	18,462
1978	1726	1349	1061	201	72	66	54	50	64	106	412	820	5,981
1979	1490	1669	1465	742	108	54	59	192	184	254	759	1088	8,064
1980	1460	1434	586	71	54	46	43	54	83	125	398	898	5,252
1981	1375	1645	1800	1053	248	78	163	320	371	590	1184	1627	10,454
1982	1467	832	78	62	48	56	43	41	46	93	307	129	3,202
1983	44	51	47	64	52	50	42	38	42	46	46	43	565
1984	45	48	49	47	46	44	52	170	216	334	560	886	2,497
1985	1658	1431	171	861	1156	447	375	309	264	613	1252	1731	10,268
1986	1289	1077	1000	801	91	50	47	54	72	118	411	814	5,824
1987	1634	2039	2021	2468	1406	402	117	226	364	529	983	1772	13,961
1988	1265	763	1030	899	193	234	520	731	525	707	1477	2217	10,561
1989	1667	1431	1366	2521	1612	443	86	106	220	583	1236	1539	12,810
1990	1658	1926	1812	2769	1133	600	485	455	498	896	1691	2213	16,136
76 - 90 AVG	1,263	1,173	983	1,139	689	332	243	293	311	480	940	1,332	9,176

SJR @ Jersey Point (49)													
Maximum Flow													
Dissolved Organic Carbon													
Units are in micrograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2521	2481	2752	3067	3481	3560	3120	3090	3307	3289	3193	2915	36,776
1977	2843	2911	3042	3274	3540	3659	3249	3124	3356	3535	3625	3394	39,552
1978	3236	3180	3399	4494	5220	4594	3548	3071	2907	3072	3116	2828	42,665
1979	2708	2623	2799	3795	4991	4008	2945	2773	2764	2866	2928	2765	37,965
1980	2624	2523	2960	3817	4912	3996	3059	2843	2903	3085	3130	2847	38,699
1981	2702	2647	2817	3209	3713	3446	2870	2844	3248	3358	3245	2886	36,985
1982	2684	2616	3078	4305	4323	4263	3276	2970	2749	2926	2991	2704	38,885
1983	2473	2934	3465	4651	5285	4312	3735	3066	3189	3216	2960	2703	41,989
1984	2556	2816	3663	3844	4152	3513	2785	2756	2858	2876	2885	2735	37,439
1985	2561	2640	3163	3240	3565	3887	3317	2960	3179	3239	3194	2925	37,870
1986	2814	2842	3143	3538	4859	4087	3269	3020	3018	3181	3109	2776	39,656
1987	2604	2566	2770	2997	3603	3671	3291	3375	3508	3524	3581	3353	38,843
1988	3186	3153	3141	3341	3939	4280	3638	3170	3262	3293	3313	3100	40,816
1989	2945	2824	2910	3164	3706	3399	2675	2728	3088	3142	3123	2831	36,535
1990	2615	2605	2877	3003	3594	3792	3100	2859	2976	2989	3049	2898	36,357
76 - 90 AVG	2,738	2,757	3,065	3,583	4,192	3,898	3,192	2,977	3,087	3,173	3,163	2,911	38,735

SJR @ Jersey Point, 49
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	685	1124	1999	2077	1532	995	518	552	496	714	1222	1290
1977	1160	1255	1301	1992	1895	980	739	1016	1129	1129	1532	1924
1978	1578	1349	1086	335	230	223	210	204	204	337	638	885
1979	1407	1658	2812	1221	295	202	186	205	216	423	832	1143
1980	1321	1267	1226	276	197	184	181	203	201	258	546	866
1981	1655	1943	3213	1631	485	232	193	225	326	531	1000	1332
1982	1428	930	205	213	184	201	172	175	177	253	530	336
1983	169	177	171	208	195	183	173	165	170	177	182	181
1984	167	170	176	179	184	179	177	194	214	380	579	902
1985	1517	1215	334	846	1079	466	274	257	333	587	1067	1408
1986	1342	1221	1541	817	224	184	191	211	210	343	572	868
1987	1477	1857	3224	2447	1318	473	247	383	451	589	996	1657
1988	1177	1008	2192	1063	332	280	356	585	509	712	1383	1822
1989	1266	1204	1164	2135	1636	592	201	233	389	648	1149	1403
1990	1486	1610	1489	2068	958	547	333	347	448	769	1412	1814
Average	1189	1199	1476	1167	716	393	277	328	365	523	909	1189

SJR @ Jersey Point, 49
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	672	1205	2263	2348	1660	1030	453	489	419	681	1305	1398
1977	1233	1332	1380	2220	2106	1006	717	1052	1191	1194	1680	2158
1978	1734	1442	1129	198	67	64	58	56	67	241	609	911
1979	1542	1845	3244	1290	139	55	50	62	87	346	843	1222
1980	1440	1375	1322	155	54	47	46	59	65	145	497	887
1981	1843	2191	3729	1804	410	108	62	95	212	459	1034	1447
1982	1567	965	86	62	48	58	42	43	47	141	477	248
1983	49	50	47	62	54	49	42	38	42	47	55	60
1984	44	44	50	47	46	43	45	57	86	294	538	932
1985	1679	1310	241	857	1129	382	149	132	226	537	1122	1541
1986	1461	1310	1696	812	86	50	51	62	70	245	529	890
1987	1629	2088	3743	2796	1417	390	113	240	356	528	1028	1834
1988	1252	1037	2483	1112	218	125	233	498	436	682	1497	2037
1989	1365	1285	1241	2412	1797	542	77	116	304	617	1224	1535
1990	1640	1788	1637	2335	982	484	230	246	370	760	1539	2030
Average	1277	1284	1620	1234	682	296	158	216	265	461	932	1275

SJR @ Jersey Point, 49
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2501	2376	2569	2995	3443	3452	3037	3091	3372	3511	3255	2845
1977	2840	2938	3097	3383	3680	3665	3202	3071	3124	3174	3401	3241
1978	3121	3060	3335	4473	5007	4494	3876	3436	3015	2919	2889	2736
1979	2642	2565	2575	3698	5122	4073	3058	3136	2926	2838	2902	2764
1980	2593	2511	2836	3768	4851	4101	3244	3154	2987	2954	2932	2783
1981	2626	2544	2578	3093	3688	3478	2919	2982	3269	3485	3350	2880
1982	2657	2596	3073	4293	4207	4326	3363	3069	2774	2868	2919	2698
1983	2487	2947	3466	4596	5318	4344	3742	3070	3110	3218	2994	2695
1984	2575	2787	3666	3880	4249	3591	2843	2939	2937	2869	2871	2724
1985	2510	2609	3033	3180	3554	3771	3335	3128	3162	3179	3186	2888
1986	2746	2738	2964	3445	4693	4090	3550	3414	3135	3002	2893	2731
1987	2581	2530	2560	2937	3599	3649	3346	3444	3469	3479	3491	3220
1988	3014	2914	2854	3250	3838	4100	3670	3224	3286	3402	3415	3074
1989	2897	2809	2914	3162	3633	3357	2682	2726	2940	2999	3100	2834
1990	2582	2543	2823	3006	3561	3646	3078	2980	3071	3120	3173	2928
Average	2691	2698	2956	3544	4163	3876	3263	3124	3106	3134	3118	2869

Terminous (344)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	149	155	158	229	245	218	215	204	174	165	159	160	2,231
1977	166	165	164	222	242	226	224	214	184	173	167	163	2,310
1978	168	170	172	247	225	226	185	159	158	164	159	157	2,190
1979	153	157	162	250	265	187	166	153	158	164	159	158	2,132
1980	151	156	160	180	190	172	167	151	155	161	159	157	1,959
1981	151	160	157	211	228	212	193	182	165	161	159	158	2,137
1982	160	173	171	205	162	193	148	141	154	160	158	153	1,976
1983	147	177	164	228	198	188	160	140	146	163	157	153	2,021
1984	148	152	178	170	165	158	167	170	160	162	158	156	1,944
1985	150	178	169	211	229	231	193	178	165	161	159	158	2,182
1986	162	164	164	239	204	176	173	151	158	167	160	156	2,074
1987	151	160	157	218	268	263	221	199	165	161	161	160	2,284
1988	162	164	168	252	253	222	210	187	170	165	163	162	2,278
1989	167	164	165	223	278	189	179	175	163	161	161	157	2,182
1990	161	163	165	209	268	222	186	183	165	164	162	161	2,209
76 - 90 AVG	156	164	165	220	228	206	186	172	163	163	160	158	2,141

Terminous (344)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	36	36	35	65	75	67	75	82	55	42	37	39	644
1977	46	44	39	64	75	72	81	88	64	48	44	42	707
1978	49	47	44	75	68	75	63	54	42	41	38	37	633
1979	39	38	38	76	88	57	53	49	43	40	37	38	596
1980	38	36	36	48	54	49	53	49	41	39	37	38	518
1981	39	40	35	58	68	68	65	68	46	38	37	37	599
1982	41	53	48	58	42	60	37	39	40	38	36	36	528
1983	35	62	46	70	58	58	48	37	41	50	37	43	585
1984	38	42	53	45	44	42	51	61	44	39	37	38	534
1985	37	57	43	58	70	78	67	65	47	38	37	37	634
1986	43	42	39	72	62	51	55	49	44	43	38	37	575
1987	38	40	35	61	87	92	77	75	46	39	39	39	668
1988	43	43	41	76	78	69	71	65	50	42	40	41	659
1989	47	42	39	64	92	56	56	59	44	38	38	37	612
1990	42	42	39	58	88	71	59	67	46	40	40	41	633
76 - 90 AVG	41	44	41	63	70	64	61	60	46	41	38	39	608

Terminous (344)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2335	2573	3077	5770	6141	4749	4367	4634	3359	3335	2851	2728	45,919
1977	2788	2929	3268	5420	6043	5011	4643	4718	3730	3769	3327	2908	48,554
1978	2901	3066	3505	6357	5569	4985	3501	3060	2674	3328	2906	2653	44,505
1979	2466	2636	3193	6344	6900	3895	2932	2812	2692	3274	2860	2694	42,698
1980	2414	2558	3084	3921	4613	3487	2984	2773	2592	3139	2864	2667	37,096
1981	2456	2756	3053	4973	5695	4584	3717	3818	2910	3103	2886	2658	42,609
1982	2588	3245	3662	4876	3640	4136	2176	2393	2533	3072	2814	2522	37,657
1983	2295	3702	3503	5873	4814	4016	2722	2330	2510	3650	2777	2732	40,924
1984	2379	2652	4027	3542	3635	3035	2947	3441	2764	3182	2849	2648	37,101
1985	2380	3473	3524	4992	5617	5260	3758	3691	2921	3115	2895	2660	44,286
1986	2637	2799	3265	5940	4900	3536	3145	2786	2741	3454	2929	2627	40,759
1987	2445	2755	3055	5215	6802	6074	4526	4349	2909	3135	2960	2738	46,963
1988	2643	2869	3385	6385	6428	4986	4195	3843	3048	3323	3087	2826	47,018
1989	2827	2819	3276	5473	7119	3855	3216	3484	2798	3093	2944	2652	43,556
1990	2620	2846	3290	4821	6796	4859	3465	3704	2859	3239	3040	2811	44,350
76 - 90 AVG	2,545	2,912	3,344	5,327	5,647	4,431	3,486	3,456	2,869	3,281	2,933	2,702	42,933

Terminous (344)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	150	155	158	228	246	219	214	202	174	162	160	160	2,231
1,977	166	165	166	222	242	226	226	214	186	174	170	165	2,310
1,978	173	169	171	246	229	226	183	159	160	167	158	159	2,190
1,979	161	159	157	251	264	186	168	154	158	160	158	158	2,132
1,980	151	156	160	182	189	171	166	152	156	162	159	157	1,959
1,981	152	160	157	206	219	207	190	182	165	162	160	158	2,137
1,982	161	173	176	206	162	193	146	141	155	160	158	153	1,976
1,983	147	177	164	227	197	187	160	141	146	163	157	153	2,021
1,984	149	152	178	169	164	158	168	172	160	160	158	156	1,944
1,985	151	181	203	219	233	239	190	174	164	162	163	159	2,182
1,986	163	164	163	242	205	176	172	152	159	165	158	156	2,074
1,987	152	160	157	215	266	264	216	198	166	165	163	162	2,284
1,988	165	164	168	253	270	226	215	193	172	166	163	162	2,278
1,989	166	164	165	223	280	189	179	177	163	161	160	158	2,182
1,990	162	164	165	209	271	232	187	184	166	163	162	162	2,209
76 - 90 AVG	158	164	167	220	229	207	185	173	163	163	160	159	2,141

Terminous (344)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	36	36	35	65	77	68	74	81	55	39	38	39	644
1,977	46	43	40	64	76	72	82	89	66	49	46	43	707
1,978	53	46	43	75	71	76	62	53	43	43	37	38	633
1,979	44	38	35	76	87	56	53	50	41	38	36	37	596
1,980	38	36	36	49	54	48	52	49	42	40	37	38	518
1,981	39	40	35	56	64	65	63	68	47	39	38	38	599
1,982	41	53	50	59	42	60	37	39	41	38	37	36	528
1,983	35	61	46	69	58	58	48	37	41	50	37	43	585
1,984	38	42	53	44	44	42	52	63	43	38	36	37	534
1,985	37	60	66	65	72	83	64	61	46	39	40	38	634
1,986	43	42	39	73	62	51	55	50	45	42	37	36	575
1,987	39	40	35	61	86	92	74	75	47	41	40	41	668
1,988	46	43	41	76	86	71	75	70	52	42	41	41	659
1,989	46	41	39	64	93	56	55	58	43	38	38	37	612
1,990	42	42	39	58	88	75	58	63	46	40	39	41	633
76 - 90 AVG	42	44	42	64	71	65	60	60	47	41	38	39	608

Terminous (344)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2337	2563	3065	5666	6145	4765	4309	4576	3357	3182	2914	2735	45,919
1,977	2786	2916	3322	5401	6026	5004	4698	4686	3811	3843	3447	2977	48,554
1,978	3085	3030	3450	6333	5721	5006	3438	3041	2730	3432	2832	2701	44,505
1,979	2658	2687	3057	6387	6857	3842	2943	2856	2612	3082	2821	2661	42,698
1,980	2415	2557	3084	4021	4569	3416	2929	2807	2612	3197	2852	2692	37,096
1,981	2464	2755	3047	4735	5431	4431	3608	3801	2930	3211	2944	2678	42,609
1,982	2592	3214	3804	4937	3638	4118	2174	2394	2553	3088	2822	2529	37,657
1,983	2290	3674	3503	5839	4797	3987	2718	2331	2522	3636	2780	2733	40,924
1,984	2383	2653	4023	3504	3605	3015	2970	3542	2713	3084	2824	2631	37,101
1,985	2381	3586	4804	5207	5722	5550	3637	3513	2869	3171	3040	2702	44,286
1,986	2673	2800	3257	6027	4940	3525	3133	2823	2773	3348	2841	2608	40,759
1,987	2449	2757	3047	5094	6754	6083	4342	4310	2946	3309	3079	2862	46,963
1,988	2777	2869	3369	6400	6928	5089	4412	4079	3174	3348	3098	2852	47,018
1,989	2803	2806	3271	5453	7174	3846	3211	3599	2765	3103	2917	2662	43,556
1,990	2615	2861	3300	4817	6904	5129	3456	3666	2861	3198	3012	2838	44,350
76 - 90 AVG	2,581	2,914	3,427	5,321	5,681	4,454	3,465	3,468	2,882	3,282	2,948	2,724	42,933

Terminous (344)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	155	158	227	246	219	212	200	172	161	161	160	2,221
1977	165	164	166	229	244	226	224	211	185	174	170	165	2,323
1978	170	170	171	245	229	226	183	159	160	165	158	159	2,195
1979	160	159	158	252	264	186	166	154	158	161	158	158	2,134
1980	151	156	159	161	169	171	166	152	156	162	159	157	1,959
1981	151	160	157	205	219	209	190	182	166	165	161	158	2,123
1982	161	172	176	206	162	193	146	141	155	160	158	153	1,983
1983	147	177	164	228	197	187	159	141	146	163	157	153	2,019
1984	148	152	178	169	164	158	168	172	160	160	158	156	1,943
1985	150	180	203	222	234	235	191	176	164	162	163	158	2,238
1986	163	163	163	242	205	176	172	152	159	166	159	156	2,076
1987	152	160	157	215	266	263	215	197	166	165	163	162	2,281
1988	164	164	168	252	271	226	212	193	169	163	164	162	2,308
1989	166	164	165	223	271	169	179	177	163	161	162	158	2,178
1990	161	163	165	209	273	232	188	186	164	161	163	162	2,227
76 - 90 AVG	157	164	167	220	229	206	185	173	163	163	161	158	2,147

Terminous (344)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	36	36	35	65	77	68	72	79	54	39	36	39	636
1977	45	43	40	68	77	72	81	86	65	48	46	44	715
1978	50	46	43	74	71	76	62	53	43	41	37	38	634
1979	43	38	35	77	87	56	53	50	41	38	36	37	591
1980	37	36	36	49	53	48	52	49	42	40	37	38	517
1981	38	40	35	55	63	66	63	68	47	41	39	38	593
1982	41	52	50	59	42	60	37	39	40	38	37	36	531
1983	35	61	46	70	58	58	47	37	41	50	37	43	583
1984	38	42	53	45	44	42	52	63	43	38	36	37	533
1985	37	60	66	66	73	80	64	63	46	39	40	38	672
1986	43	42	39	73	63	51	55	50	45	42	37	36	576
1987	39	40	35	61	86	92	73	74	47	41	40	41	669
1988	45	42	41	76	87	71	73	70	50	40	41	41	677
1989	46	41	39	64	89	55	56	59	44	38	39	37	607
1990	42	41	39	58	89	75	59	64	45	39	40	41	632
76 - 90 AVG	41	44	42	64	71	65	60	60	46	41	39	39	611

Terminous (344)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2336	2562	3063	5657	6144	4767	4229	4491	3266	3127	2939	2740	45,321
1977	2748	2885	3324	5711	6119	5005	4622	4611	3772	3819	3444	2981	49,041
1978	2957	3034	3456	6277	5718	4997	3437	3041	2734	3332	2830	2701	44,514
1979	2618	2664	3073	6408	6834	3840	2943	2845	2614	3114	2821	2661	42,435
1980	2395	2556	3063	3992	4566	3422	2933	2808	2614	3174	2855	2695	37,093
1981	2434	2758	3048	4692	5419	4496	3603	3801	2956	3319	2960	2675	42,181
1982	2594	3173	3796	4936	3638	4136	2175	2395	2543	3069	2822	2528	37,825
1983	2290	3673	3502	5868	4804	3987	2700	2331	2522	3636	2780	2729	40,822
1984	2381	2653	4024	3508	3806	3015	2971	3543	2714	3085	2824	2631	36,957
1985	2366	3575	4801	5327	5738	5394	3645	3601	2868	3192	3047	2685	46,239
1986	2667	2793	3253	6039	4941	3523	3140	2820	2772	3407	2845	2608	40,808
1987	2449	2756	3047	5095	6751	6081	4319	4283	2931	3289	3068	2859	46,928
1988	2749	2854	3361	6368	6965	5093	4301	4057	3039	3206	3111	2844	47,950
1989	2775	2805	3269	5450	6918	3830	3216	3615	2791	3126	3003	2658	43,456
1990	2603	2828	3301	4807	6989	5140	3505	3756	2807	3125	3038	2821	44,720
76 - 90 AVG	2,557	2,905	3,427	5,342	5,677	4,448	3,449	3,467	2,863	3,269	2,960	2,721	43,086

Terminous (344)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	155	158	229	247	219	214	203	174	162	160	160	2,231
1977	166	165	166	222	242	226	223	212	186	174	170	165	2,317
1978	173	169	171	246	229	227	184	159	160	167	158	159	2,202
1979	161	159	157	254	266	186	166	154	158	160	158	158	2,137
1980	151	156	160	182	189	171	166	152	156	165	158	157	1,963
1981	152	160	157	206	220	209	190	184	165	162	160	158	2,123
1982	160	172	176	206	162	193	146	141	155	161	158	153	1,983
1983	147	177	164	228	197	187	160	141	146	163	157	153	2,020
1984	149	152	178	169	164	158	168	172	160	160	158	156	1,944
1985	151	182	170	206	233	240	190	175	164	162	163	159	2,195
1986	163	164	163	239	205	176	172	152	159	165	156	156	2,072
1987	152	160	157	215	266	264	219	202	188	186	164	162	2,295
1988	166	165	168	252	271	226	219	195	172	186	164	162	2,326
1989	167	164	165	223	280	189	179	177	163	161	160	158	2,186
1990	162	164	165	209	269	231	187	185	166	164	163	162	2,227
76 - 90 AVG	158	164	165	219	229	207	186	174	163	164	161	159	2,148

Terminous (344)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	36	36	35	66	77	68	74	81	56	39	38	39	645
1977	46	43	40	64	76	72	80	87	66	49	46	44	713
1978	53	46	43	75	71	76	62	53	43	43	37	38	640
1979	44	38	35	78	88	56	53	50	41	38	36	37	594
1980	38	36	36	49	54	48	52	49	42	43	37	38	522
1981	39	40	35	56	64	66	63	70	47	39	38	37	594
1982	41	52	50	59	42	60	38	39	41	39	37	36	534
1983	35	62	46	70	58	58	48	37	41	50	37	43	585
1984	38	42	53	45	44	42	52	63	43	38	36	37	533
1985	37	61	43	56	72	83	64	61	46	39	40	38	640
1986	44	43	39	72	62	51	55	50	45	42	37	36	576
1987	39	40	35	61	86	92	76	78	49	42	41	41	680
1988	46	43	41	76	87	71	77	71	52	42	41	41	688
1989	47	42	39	64	93	56	55	58	43	38	38	37	610
1990	42	42	39	58	87	75	58	64	47	40	40	41	633
76 - 90 AVG	42	44	41	63	71	65	60	61	47	41	39	39	612

Terminous (344)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2339	2563	3075	5723	6163	4766	4311	4594	3391	3174	2926	2745	45,770
1977	2786	2917	3328	5423	6035	5001	4593	4640	3805	3848	3448	2984	48,808
1978	3086	3030	3456	6330	5720	5015	3442	3048	2732	3484	2832	2700	44,875
1979	2658	2666	3050	6490	6892	3840	2940	2857	2613	3082	2821	2661	42,570
1980	2418	2557	3084	4025	4573	3416	2929	2808	2613	3368	2850	2692	37,333
1981	2457	2751	3047	4740	5453	4469	3615	3868	2935	3211	2939	2665	42,150
1982	2583	3211	3806	4938	3638	4117	2177	2396	2582	3112	2829	2531	37,920
1983	2295	3686	3498	5868	4800	3986	2721	2331	2522	3636	2780	2730	40,853
1984	2381	2655	4023	3517	3607	3022	2973	3543	2713	3085	2824	2631	36,974
1985	2386	3641	3540	4787	5708	5564	3635	3536	2872	3210	3054	2701	44,634
1986	2688	2810	3258	5923	4935	3524	3134	2825	2772	3357	2842	2608	40,674
1987	2448	2757	3047	5095	6755	6085	4485	4445	3017	3369	3132	2863	47,498
1988	2809	2893	3368	6364	6974	5110	4547	4148	3198	3369	3111	2853	48,744
1989	2826	2812	3272	5457	7196	3848	3212	3599	2765	3103	2917	2662	43,669
1990	2617	2865	3301	4819	6864	5123	3457	3738	2912	3244	3043	2641	44,624
76 - 90 AVG	2,585	2,921	3,343	5,300	5,688	4,459	3,478	3,492	2,896	3,310	2,957	2,724	43,153

Terminous (344)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	155	158	229	247	219	214	203	174	162	160	160	2,231
1977	166	165	166	222	242	226	223	212	186	174	170	165	2,317
1978	173	169	171	246	229	227	184	159	160	167	158	159	2,202
1979	161	159	157	254	266	186	166	154	158	160	158	158	2,137
1980	151	156	160	182	189	171	166	152	156	165	158	157	1,963
1981	152	160	157	206	220	209	190	184	165	162	160	158	2,123
1982	160	172	176	206	162	193	146	141	155	161	158	153	1,983
1983	147	177	164	228	197	187	160	141	146	163	157	153	2,020
1984	149	152	178	169	164	158	168	172	160	160	158	156	1,944
1985	151	182	170	206	233	240	190	175	164	162	163	159	2,195
1986	163	164	163	239	205	176	172	152	159	165	158	156	2,072
1987	152	160	157	215	266	264	219	202	168	166	164	162	2,295
1988	166	165	168	252	271	226	219	195	172	166	164	162	2,326
1989	167	164	165	223	280	189	179	177	163	161	160	158	2,186
1990	162	164	165	209	269	231	187	185	166	164	163	162	2,227
76 - 90 AVG	158	164	165	219	229	207	186	174	163	164	161	159	2,148

Terminous (344)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	36	36	35	66	77	68	74	81	56	39	38	39	645
1977	46	43	40	64	76	72	80	87	66	49	46	44	713
1978	53	46	43	75	71	76	62	53	43	43	37	38	640
1979	44	38	35	78	88	56	53	50	41	38	36	37	594
1980	38	36	36	49	54	48	52	49	42	43	37	38	522
1981	39	40	35	56	64	66	63	70	47	39	38	37	594
1982	41	52	50	59	42	60	38	39	41	39	37	36	534
1983	35	62	46	70	58	58	48	37	41	50	37	43	585
1984	38	42	53	45	44	42	52	63	43	38	36	37	533
1985	37	61	43	56	72	83	64	61	46	39	40	38	640
1986	44	43	39	72	62	51	55	50	45	42	37	36	576
1987	39	40	35	61	86	92	76	78	49	42	41	41	680
1988	46	43	41	76	87	71	77	71	52	42	41	41	688
1989	47	42	39	64	93	56	55	58	43	38	38	37	610
1990	42	42	39	58	87	75	58	64	47	40	40	41	633
76 - 90 AVG	42	44	41	63	71	65	60	61	47	41	39	39	612

Terminous (344)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2339	2563	3075	5723	6163	4766	4311	4594	3391	3174	2926	2745	45,770
1977	2786	2917	3328	5423	6035	5001	4593	4640	3805	3848	3448	2984	48,808
1978	3086	3030	3456	6330	5720	5015	3442	3048	2732	3484	2832	2700	44,875
1979	2658	2666	3050	6490	6892	3840	2940	2857	2613	3082	2821	2661	42,570
1980	2418	2557	3084	4025	4573	3416	2929	2808	2613	3368	2850	2692	37,333
1981	2457	2751	3047	4740	5453	4469	3615	3868	2935	3211	2939	2665	42,150
1982	2583	3211	3806	4938	3638	4117	2177	2396	2582	3112	2829	2531	37,920
1983	2295	3686	3498	5868	4800	3986	2721	2331	2522	3636	2780	2730	40,853
1984	2381	2655	4023	3517	3607	3022	2973	3543	2713	3085	2824	2631	36,974
1985	2386	3641	3540	4787	5708	5564	3635	3536	2872	3210	3054	2701	44,634
1986	2688	2810	3256	5923	4935	3524	3134	2825	2772	3357	2842	2608	40,674
1987	2448	2757	3047	5095	6755	6085	4485	4445	3017	3369	3132	2863	47,498
1988	2809	2893	3368	6364	6974	5110	4547	4148	3198	3369	3111	2853	48,744
1989	2826	2812	3272	5457	7196	3848	3212	3599	2765	3103	2917	2662	43,669
1990	2617	2865	3301	4819	6864	5123	3457	3738	2912	3244	3043	2841	44,824
76 - 90 AVG	2,585	2,921	3,343	5,300	5,688	4,459	3,478	3,492	2,896	3,310	2,957	2,724	43,153

Terminous (344)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	155	158	223	244	221	217	208	174	166	162	161	2,239
1977	167	166	164	223	242	233	225	212	186	174	170	165	2,327
1978	172	170	171	248	238	228	184	159	160	167	159	159	2,215
1979	161	160	158	252	265	185	166	154	158	162	158	159	2,138
1980	152	156	160	182	189	171	166	152	156	166	159	157	1,966
1981	152	160	157	211	221	209	189	187	172	168	162	158	2,146
1982	161	172	176	207	162	193	146	141	155	162	159	153	1,987
1983	147	177	163	230	198	187	160	140	146	155	157	152	2,012
1984	149	152	178	169	164	158	168	172	160	160	158	156	1,944
1985	151	183	170	206	233	242	192	180	170	166	163	159	2,215
1986	164	164	163	243	205	176	173	152	159	166	159	156	2,080
1987	152	160	157	216	266	264	228	209	174	170	168	164	2,328
1988	170	169	168	254	274	251	222	196	173	167	165	162	2,371
1989	165	164	165	223	279	190	178	181	169	165	162	158	2,199
1990	161	164	165	209	273	233	193	192	168	165	163	162	2,248
76 - 90 AVG	158	165	165	220	230	209	187	176	165	165	162	159	2,161

Terminous (344)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	37	36	35	63	76	69	76	86	55	42	39	40	654
1977	48	44	39	64	75	76	81	87	66	49	46	44	719
1978	52	47	43	76	75	76	62	54	43	43	37	38	646
1979	44	39	36	77	88	56	53	51	41	39	37	38	599
1980	38	38	36	49	54	48	52	49	42	44	37	38	523
1981	39	41	35	58	65	66	62	73	55	43	40	38	615
1982	41	52	50	59	42	60	38	39	41	39	37	36	534
1983	36	62	46	71	58	58	48	37	42	39	37	36	570
1984	38	42	53	45	44	42	52	63	43	38	36	37	533
1985	38	62	43	56	72	84	66	87	52	43	40	39	662
1986	45	43	39	74	63	51	56	50	45	43	37	36	582
1987	39	40	35	61	86	92	81	83	55	45	44	43	704
1988	51	46	41	76	88	83	78	73	54	43	42	42	717
1989	45	41	39	64	93	56	55	62	50	42	40	37	624
1990	42	42	39	58	89	76	62	69	49	41	40	41	648
76 - 90 AVG	42	45	41	63	71	66	61	63	49	42	39	39	622

Terminous (344)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2359	2568	3064	5418	6062	4867	4416	4796	3353	3398	3008	2779	46,088
1977	2853	2939	3270	5496	6074	5229	4634	4657	3809	3846	3445	2981	49,233
1978	3041	3039	3455	6416	5969	5040	3443	3054	2734	3485	2856	2702	45,234
1979	2658	2710	3090	6407	6877	3829	2937	2875	2626	3186	2839	2706	42,740
1980	2440	2561	3085	4031	4575	3419	2935	2813	2631	3428	2868	2692	37,478
1981	2481	2775	3047	4907	5492	4486	3571	4020	3331	3478	3043	2683	43,314
1982	2593	3186	3808	4948	3644	4138	2178	2396	2582	3179	2853	2532	38,037
1983	2320	3688	3482	5966	4817	3981	2723	2330	2527	2957	2779	2517	40,087
1984	2401	2660	4028	3519	3607	3022	2973	3543	2713	3085	2824	2631	37,006
1985	2431	3670	3549	4788	5717	5632	3707	3778	3193	3410	3067	2718	45,660
1986	2749	2825	3260	6090	4945	3529	3147	2823	2774	3448	2848	2609	41,047
1987	2449	2755	3047	5098	6758	6095	4808	4717	3351	3613	3342	2973	49,006
1988	2985	3030	3378	6428	7047	5993	4635	4218	3252	3452	3204	2872	50,494
1989	2774	2804	3272	5484	7175	3863	3202	3796	3108	3330	3026	2662	44,496
1990	2606	2846	3298	4818	6990	5167	3734	4019	2965	3286	3058	2825	45,612
76 - 90 AVG	2,609	2,937	3,342	5,321	5,717	4,553	3,536	3,589	2,997	3,372	3,004	2,725	43,702

Terminous, 344
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	149	165	176	226	234	206	209	196	177	172	159	161
1977	168	169	171	228	254	229	218	209	173	172	167	164
1978	189	167	169	246	227	223	184	162	159	161	158	158
1979	162	159	175	256	266	185	167	155	157	160	159	157
1980	151	156	176	181	188	172	165	153	155	160	158	157
1981	151	160	175	214	215	206	189	184	173	173	161	158
1982	160	173	173	205	161	195	147	141	155	160	158	153
1983	146	176	163	225	196	189	159	140	146	161	157	153
1984	148	152	178	170	165	158	164	170	160	160	158	156
1985	150	181	204	217	218	226	192	181	169	188	162	159
1986	162	162	185	247	203	177	177	152	159	160	158	155
1987	151	160	176	224	255	251	224	194	174	189	165	163
1988	165	165	205	276	259	238	220	194	174	172	164	162
1989	165	163	165	223	269	189	177	179	165	166	162	158
1990	160	163	164	208	266	221	196	191	167	168	163	161
Average	157	165	177	223	225	204	186	173	164	165	161	158

Terminous, 344
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	36	47	51	68	72	62	71	74	58	47	37	40
1977	49	46	43	67	81	72	75	84	53	47	44	43
1978	50	45	42	75	70	74	64	58	43	38	36	37
1979	43	38	48	81	89	56	53	53	41	38	37	38
1980	37	36	47	49	53	49	52	51	42	39	36	39
1981	38	40	49	63	63	65	63	67	55	47	38	38
1982	41	53	49	59	41	62	38	39	41	38	37	36
1983	36	60	46	69	58	59	48	37	41	48	37	43
1984	38	41	53	45	44	42	51	62	43	38	37	37
1985	37	61	67	65	66	77	67	66	50	43	39	38
1986	43	41	54	77	61	51	59	51	45	38	36	36
1987	38	40	50	69	82	86	80	69	54	45	42	42
1988	46	43	64	90	81	77	77	70	54	46	42	41
1989	46	41	39	64	88	56	55	63	47	42	40	37
1990	40	41	39	57	85	70	66	71	49	44	40	41
Average	41	45	49	67	69	64	61	61	48	43	39	39

Terminous, 344
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2332	3019	3647	5429	5711	4369	4222	4437	3535	3742	2848	2765
1977	2899	3035	3500	5707	6455	5139	4488	4595	3203	3745	3321	2939
1978	2955	2959	3408	6315	5629	4916	3504	3253	2700	3101	2812	2660
1979	2639	2651	3509	6482	6928	3818	2978	2960	2609	3097	2859	2671
1980	2397	2587	3635	3969	4541	3464	2919	2879	2597	3094	2806	2687
1981	2436	2750	3507	4949	5263	4403	3613	3889	3350	3781	2970	2683
1982	2578	3253	3711	4897	3606	4212	2192	2395	2582	3073	2835	2523
1983	2326	3826	3477	5769	4770	4069	2717	2329	2499	3510	2764	2720
1984	2395	2619	4014	3555	3641	3038	2894	3505	2712	3063	2821	2618
1985	2374	3814	4831	5142	5272	5147	3779	3832	3085	3492	3009	2700
1986	2689	2757	4040	6202	4884	3556	3311	2871	2762	3062	2820	2596
1987	2431	2741	3511	5269	6383	5718	4779	4260	3361	3579	3218	2906
1988	2784	2893	4587	7072	6587	5565	4624	4176	3296	3692	3169	2830
1989	2777	2805	3271	5452	6838	3841	3156	3706	2894	3337	3041	2661
1990	2545	2789	3274	4782	6749	4796	3900	4017	2974	3492	3060	2814
Average	2569	2940	3728	5399	5550	4403	3538	3540	2944	3391	2957	2718

SJR @ San Andreas Landing (45)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	183	167	174	331	491	452	353	326	293	331	451	478	4,030
1977	579	695	640	868	968	637	453	434	493	619	747	870	8,003
1978	736	620	440	271	219	220	202	188	175	181	212	230	3,694
1979	301	482	468	359	253	203	183	183	177	186	248	341	3,384
1980	452	422	274	169	183	175	176	180	173	181	202	251	2,860
1981	318	412	284	203	197	186	162	203	247	300	363	429	3,324
1982	500	448	189	209	171	188	160	167	165	169	174	163	2,703
1983	157	187	167	194	179	173	164	157	165	185	168	166	2,062
1984	160	172	171	177	185	178	173	195	196	187	211	287	2,292
1985	453	461	190	279	430	267	223	239	225	287	363	440	3,857
1986	497	475	358	392	197	170	179	184	180	188	208	296	3,324
1987	468	648	538	847	698	337	219	219	252	305	420	521	5,472
1988	449	383	349	429	261	255	345	406	324	335	582	714	4,832
1989	609	528	493	814	786	310	185	204	237	287	385	444	5,282
1990	499	629	595	1107	727	355	345	316	264	319	523	667	6,346
76 - 90 AVG	424	449	355	445	398	274	236	240	238	271	350	420	4,098

SJR @ San Andreas Landing (45)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	68	44	51	225	415	373	254	221	184	232	383	420	2,870
1977	536	666	599	872	992	596	373	346	418	570	730	886	7,584
1978	720	561	350	114	62	65	57	53	49	56	95	120	2,302
1979	208	424	404	237	84	59	49	58	56	62	139	254	2,034
1980	391	354	170	55	50	43	46	50	49	56	83	145	1,492
1981	228	337	183	70	52	47	47	75	134	200	278	361	2,012
1982	446	382	67	61	44	54	38	42	42	44	52	42	1,314
1983	38	57	45	56	48	46	39	38	40	51	42	42	540
1984	40	46	48	45	48	45	43	71	77	64	95	190	812
1985	392	398	68	165	340	138	92	119	107	185	278	374	2,656
1986	443	412	268	293	64	45	48	53	53	60	88	199	2,026
1987	409	622	490	854	662	226	87	90	139	205	346	471	4,601
1988	384	296	254	343	133	130	243	322	228	240	539	702	3,814
1989	572	469	430	809	764	203	59	84	126	185	305	379	4,385
1990	446	596	553	1167	698	248	246	217	158	222	469	646	5,666
76 - 90 AVG	355	378	265	358	297	155	115	122	124	162	261	349	2,941

SJR @ San Andreas Landing (45)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2356	2493	2915	3481	3812	3531	3051	3088	3191	3173	2958	2748	36,797
1977	2755	2865	3076	3454	3770	3600	3188	3234	3379	3501	3507	3212	39,541
1978	3030	3044	3411	4852	4911	4567	3665	3163	2742	2974	2962	2701	42,022
1979	2594	2592	2915	4185	5669	4077	3018	2759	2676	2950	2899	2744	39,078
1980	2565	2526	3020	3819	4952	4016	3181	2884	2705	2926	2894	2746	38,234
1981	2603	2655	2949	3503	4122	3648	3012	2934	2874	2904	2674	2694	36,772
1982	2609	2650	3203	4340	4211	4160	3008	2816	2535	2827	2782	2545	37,686
1983	2347	3202	3469	4427	5053	4045	3596	2888	3194	3449	2856	2698	41,224
1984	2423	2798	3693	3814	4187	3469	2746	2734	2761	2929	2857	2717	37,128
1985	2516	2700	3152	3405	3869	3811	3170	2937	2860	2907	2888	2716	36,931
1986	2646	2713	3138	3666	4755	3873	3242	3002	2637	3113	3031	2770	38,786
1987	2591	2645	2921	3272	3877	3657	3183	3109	2911	2928	2946	2782	36,822
1988	2638	2740	3099	3451	3915	3770	3105	2889	2887	3030	3094	2896	37,514
1989	2841	2822	3024	3414	3934	3324	2623	2665	2733	2873	2913	2706	35,872
1990	2599	2702	3022	3228	3825	3810	2922	2751	2793	2960	3015	2850	36,477
76 - 90 AVG	2,608	2,743	3,134	3,754	4,324	3,824	3,114	2,924	2,872	3,030	2,965	2,768	38,059

SJR @ San Andreas Landing (45)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	190	176	256	682	744	509	362	348	309	296	422	528	4,030
1,977	832	771	751	992	1024	655	462	470	559	659	772	907	8,003
1,978	803	641	421	269	240	234	193	180	173	182	214	283	3,694
1,979	439	530	454	400	262	200	178	183	182	200	293	370	3,384
1,980	426	362	244	220	186	168	170	175	173	182	208	297	2,860
1,981	426	550	498	399	223	184	182	233	260	304	407	487	3,324
1,982	535	427	187	217	182	190	156	162	164	171	182	165	2,703
1,983	155	189	172	192	163	149	140	155	163	176	166	164	2,062
1,984	158	193	176	173	176	173	171	187	191	199	236	298	2,292
1,985	433	489	231	341	523	326	253	291	257	292	418	518	3,857
1,986	520	466	361	394	248	163	168	179	180	186	207	279	3,324
1,987	433	625	549	946	723	333	215	217	251	296	429	667	5,472
1,988	625	488	421	472	275	254	324	369	319	326	559	785	4,832
1,989	736	569	490	830	796	303	183	189	209	269	387	449	5,282
1,990	521	665	638	1081	681	355	366	356	286	321	482	658	6,346
76 - 90 AVG	489	477	390	507	430	280	235	246	245	271	359	457	4,098

SJR @ San Andreas Landing (45)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	77	56	151	651	722	442	264	248	205	191	348	479	2,870
1,977	599	756	731	1020	1060	618	383	390	499	618	758	928	7,584
1,978	788	575	326	112	74	72	53	49	48	56	97	183	2,302
1,979	371	480	390	288	94	57	47	59	61	81	195	290	2,034
1,980	360	306	134	70	50	43	42	48	50	57	90	200	1,492
1,981	359	505	442	311	93	51	52	115	150	203	330	430	2,012
1,982	488	357	64	66	49	54	38	39	42	46	61	45	1,314
1,983	36	58	47	56	48	46	39	36	40	48	41	40	540
1,984	39	58	49	44	44	42	42	60	70	80	126	203	812
1,985	368	432	115	242	453	207	127	186	149	190	342	467	2,656
1,986	468	399	270	296	91	46	45	51	53	58	89	180	2,026
1,987	369	594	503	975	693	220	84	90	138	193	354	645	4,601
1,988	590	417	343	394	145	124	215	274	218	227	510	788	3,814
1,989	726	522	428	829	776	195	57	65	91	164	307	385	4,385
1,990	472	641	604	1136	644	249	273	267	184	224	420	636	5,666
76 - 90 AVG	407	410	306	433	336	164	117	132	133	162	271	393	2,941

SJR @ San Andreas Landing (45)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2359	2476	2881	3394	3758	3527	3036	3051	3178	3098	2961	2770	36,797
1,977	2757	2850	3085	3453	3758	3593	3205	3218	3371	3541	3589	3312	39,541
1,978	3197	3148	3397	4841	5256	4575	3565	3060	2749	3030	2899	2728	42,022
1,979	2667	2626	2893	4075	5468	4016	2924	2750	2595	2817	2796	2855	39,078
1,980	2523	2516	3017	3838	4855	3838	3012	2827	2719	2952	2893	2757	38,234
1,981	2615	2648	2922	3286	3816	3382	2817	2828	2861	2967	2954	2731	36,772
1,982	2624	2649	3200	4367	4197	4126	2980	2804	2558	2841	2797	2557	37,686
1,983	2313	3118	3467	4413	5042	4031	3575	2876	3205	3421	2863	2662	41,224
1,984	2397	2781	3687	3778	4124	3405	2731	2780	2721	2848	2794	2670	37,128
1,985	2498	2710	3148	3310	3795	3955	3163	2814	2779	2925	2998	2796	36,931
1,986	2703	2740	3134	3636	4719	3840	3229	3013	2863	3066	2891	2687	38,786
1,987	2568	2644	2914	3219	3845	3654	3082	3012	2915	3002	3099	2968	36,822
1,988	2852	2853	3093	3444	4064	3904	3218	3025	3043	3125	3139	2953	37,514
1,989	2659	2784	2994	3395	3940	3321	2617	2701	2720	2864	2901	2710	35,872
1,990	2595	2693	3019	3221	3788	3753	2879	2696	2741	2922	2975	2860	36,477
76 - 90 AVG	2,635	2,749	3,123	3,711	4,295	3,795	3,069	2,898	2,868	3,028	2,970	2,788	38,059

SJR @ San Andreas Landing (45)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	184	174	254	677	735	503	361	347	302	286	422	545	4,790
1977	691	867	790	925	977	656	461	463	545	652	772	914	8,713
1978	789	664	464	271	233	220	197	183	174	181	211	282	3,869
1979	444	536	443	392	260	199	178	183	180	198	294	373	3,680
1980	414	361	229	188	182	173	173	177	174	182	212	306	2,771
1981	409	458	430	378	218	184	183	239	259	302	409	471	3,940
1982	513	400	184	209	172	187	159	166	165	171	181	164	2,671
1983	155	180	166	194	179	172	163	156	164	182	168	164	2,043
1984	158	170	171	176	182	175	172	187	192	199	236	298	2,316
1985	429	467	225	311	494	321	244	266	235	288	425	516	4,221
1986	530	490	356	383	196	170	181	186	182	187	208	279	3,348
1987	431	620	544	934	713	329	214	217	252	298	432	668	5,652
1988	690	596	481	479	271	252	333	380	313	297	495	695	5,282
1989	673	572	497	826	811	318	185	189	208	278	434	489	5,480
1990	514	658	638	1051	639	338	340	323	277	312	474	651	6,215
76 - 90 AVG	468	481	391	493	417	280	236	244	241	268	358	454	4,333

SJR @ San Andreas Landing (45)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	69	54	148	645	712	434	265	248	197	181	348	500	3,801
1977	673	879	782	937	1001	619	383	384	484	611	759	936	8,448
1978	777	614	382	115	70	65	56	51	48	55	95	181	2,509
1979	378	488	376	279	93	56	47	59	59	78	196	293	2,402
1980	346	281	117	53	49	43	43	49	50	57	95	210	1,393
1981	338	393	360	286	87	50	53	122	149	200	331	411	2,780
1982	461	323	60	62	44	54	38	41	42	46	60	44	1,275
1983	36	54	45	56	48	46	39	36	40	51	42	41	534
1984	39	45	48	44	47	43	42	60	70	80	126	204	848
1985	364	405	108	206	418	202	118	154	122	184	350	465	3,096
1986	480	429	265	282	63	45	49	53	54	59	90	179	2,048
1987	365	588	497	960	682	216	83	91	140	196	358	646	4,822
1988	671	552	416	403	141	122	226	288	213	195	434	679	4,340
1989	652	528	436	825	796	214	60	64	90	173	362	434	4,634
1990	465	633	605	1100	591	229	240	226	173	215	410	627	5,514
76 - 90 AVG	408	418	310	417	323	163	116	128	129	159	270	390	3,230

SJR @ San Andreas Landing (45)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2356	2476	2881	3391	3756	3528	3005	3008	3090	3020	2960	2781	36,252
1977	2727	2791	3059	3539	3832	3604	3179	3169	3333	3516	3574	3306	39,629
1978	3110	3067	3382	4811	5250	4571	3565	3079	2752	2989	2876	2726	42,178
1979	2644	2611	2900	4088	5461	4011	2923	2740	2592	2834	2805	2655	38,264
1980	2495	2505	3011	3828	4852	3853	3026	2832	2721	2941	2891	2758	37,713
1981	2559	2623	2925	3280	3812	3449	2649	2829	2875	3012	3002	2743	35,958
1982	2632	2645	3197	4366	4200	4147	2982	2801	2551	2838	2795	2549	37,703
1983	2311	3117	3465	4423	5045	4032	3573	2876	3204	3422	2863	2660	40,991
1984	2396	2781	3687	3777	4124	3405	2732	2781	2722	2848	2794	2670	36,717
1985	2464	2698	3146	3347	3824	3873	3123	2845	2799	2936	3011	2784	36,850
1986	2692	2733	3129	3640	4720	3839	3267	3035	2864	3097	2911	2690	38,617
1987	2569	2642	2914	3220	3845	3654	3067	2992	2899	2988	3080	2956	36,826
1988	2826	2813	3073	3433	4073	3913	3175	2988	2910	2977	3077	2926	38,184
1989	2825	2766	2991	3392	3889	3295	2617	2707	2741	2883	2959	2728	35,793
1990	2583	2667	3009	3221	3804	3770	2907	2737	2733	2881	2978	2847	36,137
76 - 90 AVG	2,613	2,729	3,118	3,717	4,299	3,796	3,066	2,895	2,852	3,012	2,972	2,785	37,854

SJR @ San Andreas Landing (45)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	183	174	250	653	734	506	359	335	298	293	427	545	4,757
1977	644	767	752	984	1011	647	460	469	557	663	778	914	8,646
1978	806	639	422	269	233	220	197	183	174	184	215	282	3,824
1979	438	525	457	415	265	199	178	184	182	202	295	370	3,710
1980	427	388	245	189	182	173	173	177	174	184	210	291	2,813
1981	456	628	537	491	252	189	182	226	252	302	403	465	4,383
1982	504	420	187	209	172	187	159	167	166	173	187	168	2,699
1983	155	180	165	193	178	172	163	156	164	182	168	164	2,040
1984	158	170	171	176	182	175	172	187	192	199	236	298	2,316
1985	436	520	201	331	524	325	252	281	249	298	439	526	4,382
1986	529	480	364	368	194	170	179	185	182	186	206	279	3,324
1987	429	618	544	934	714	329	216	216	244	289	421	639	5,593
1988	562	426	381	444	265	250	313	350	309	324	554	781	4,959
1989	733	576	494	822	786	301	183	189	208	270	389	449	5,400
1990	519	654	627	1071	681	356	363	345	274	322	531	720	6,463
76 - 90 AVG	465	478	386	503	425	280	237	243	242	271	384	459	4,354

SJR @ San Andreas Landing (45)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	68	54	143	615	709	438	261	232	191	187	354	501	3,753
1977	615	754	733	1010	1043	609	381	391	497	624	766	936	6,359
1978	793	575	328	112	70	65	56	51	48	57	98	182	2,435
1979	369	474	393	306	98	56	47	59	61	83	198	290	2,434
1980	361	313	135	54	49	43	43	49	50	58	92	193	1,440
1981	394	599	489	423	129	57	52	105	140	200	325	404	3,317
1982	451	348	64	62	44	54	38	41	43	47	67	49	1,308
1983	38	54	45	56	48	46	39	36	40	51	42	41	534
1984	39	45	48	44	47	44	43	60	70	80	126	203	849
1985	372	469	81	230	454	205	127	174	139	197	368	477	3,293
1986	479	416	275	265	61	45	48	53	54	58	90	179	2,023
1987	363	586	497	960	682	216	64	85	128	183	343	610	4,737
1988	511	336	293	360	134	120	200	249	206	223	504	782	3,918
1989	723	530	433	820	764	192	57	65	90	164	310	385	4,533
1990	470	628	590	1123	644	251	269	253	170	226	479	711	5,814
76 - 90 AVG	403	412	303	429	332	163	116	127	128	163	277	396	3,250

SJR @ San Andreas Landing (45)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2355	2476	2886	3418	3773	3530	3037	3061	3211	3107	2971	2781	36,606
1977	2762	2853	3090	3462	3764	3594	3165	3167	3351	3533	3584	3311	39,636
1978	3197	3146	3399	4840	5254	4580	3565	3084	2751	3064	2916	2729	42,527
1979	2668	2626	2890	4105	5494	4015	2916	2748	2596	2817	2798	2655	38,326
1980	2526	2518	3017	3839	4856	3839	3012	2827	2720	3021	2923	2755	37,853
1981	2608	2635	2917	3259	3799	3405	2832	2852	2879	2970	2954	2721	35,831
1982	2610	2643	3201	4367	4197	4128	2981	2804	2579	2863	2817	2565	37,755
1983	2316	3123	3462	4417	5043	4032	3577	2876	3204	3421	2863	2660	40,996
1984	2396	2782	3687	3783	4126	3413	2734	2781	2721	2848	2794	2670	36,735
1985	2504	2720	3166	3335	3799	3966	3167	2823	2786	2944	3022	2802	37,034
1986	2714	2751	3136	3600	4714	3840	3230	3014	2864	3074	2896	2688	38,521
1987	2568	2643	2915	3220	3846	3655	3169	3127	2992	3065	3172	3005	37,377
1988	2888	2900	3110	3442	4080	3924	3276	3088	3081	3158	3166	2966	39,079
1989	2874	2804	3001	3399	3946	3324	2617	2701	2720	2864	2900	2710	35,860
1990	2598	2699	3024	3224	3782	3746	2878	2716	2778	2954	3018	2879	36,296
76 - 90 AVG	2,639	2,755	3,127	3,714	4,298	3,799	3,077	2,911	2,882	3,047	2,986	2,793	38,029

SJR @ San Andreas Landing (45)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	198	176	255	674	735	503	356	336	302	295	445	546	4,821
1977	562	610	531	762	933	629	452	456	543	651	773	924	7,826
1978	812	666	449	273	231	220	197	183	174	184	216	287	3,892
1979	443	531	458	415	265	199	178	183	182	197	289	366	3,706
1980	438	396	246	189	182	173	173	177	174	184	208	292	2,832
1981	462	636	538	501	259	190	182	226	249	290	375	439	4,347
1982	501	403	185	209	172	187	159	167	166	173	186	168	2,676
1983	155	160	165	195	178	172	163	156	164	182	168	164	2,042
1984	158	170	171	176	182	175	172	187	192	200	236	297	2,316
1985	430	515	202	328	520	325	252	266	235	284	407	504	4,268
1986	485	413	338	401	197	170	180	186	182	188	207	281	3,228
1987	435	621	543	934	714	329	218	218	241	284	412	654	5,603
1988	577	470	452	480	275	239	280	325	291	302	519	733	4,943
1989	684	557	493	821	809	319	185	193	221	276	406	468	5,432
1990	510	654	623	1048	653	342	298	280	266	295	434	584	5,987
76 - 90 AVG	457	467	377	494	420	278	230	236	239	266	352	447	4,261

SJR @ San Andreas Landing (45)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	86	57	149	642	711	435	257	232	194	190	375	501	3,829
1977	513	556	467	745	949	586	371	373	479	610	759	947	7,355
1978	800	606	360	117	70	65	56	51	48	56	99	188	2,516
1979	376	482	395	306	98	56	46	58	61	77	190	285	2,430
1980	374	323	137	54	49	43	43	49	50	58	90	194	1,464
1981	402	609	491	435	137	58	52	106	136	183	290	372	3,271
1982	447	328	61	62	44	54	38	41	43	47	65	48	1,278
1983	37	54	45	56	48	46	39	36	40	51	42	41	535
1984	39	45	48	44	47	43	42	60	70	81	126	202	847
1985	365	463	82	226	449	205	127	155	121	178	329	449	3,149
1986	427	336	243	303	65	45	48	53	54	59	89	182	1,904
1987	370	590	496	959	682	216	84	84	122	176	332	628	4,739
1988	533	399	382	405	145	103	156	214	181	198	463	725	3,904
1989	665	509	432	819	794	215	60	70	105	170	328	408	4,575
1990	460	629	587	1096	609	234	188	173	160	193	362	546	5,237
76 - 90 AVG	393	399	292	418	326	160	107	117	124	155	263	381	3,136

SJR @ San Andreas Landing (45)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2361	2477	2882	3395	3759	3526	3057	3098	3250	3134	2994	2782	36,715
1977	2801	2930	3080	3441	3766	3594	3217	3240	3385	3547	3590	3340	39,931
1978	3196	3163	3416	4866	5231	4581	3566	3084	2755	3066	2915	2729	42,568
1979	2653	2617	2888	4105	5499	4002	2901	2745	2595	2844	2810	2656	38,315
1980	2535	2521	3017	3838	4855	3838	3008	2822	2717	2999	2907	2749	37,806
1981	2595	2625	2912	3262	3805	3402	2828	2848	2984	3105	3017	2742	36,125
1982	2629	2646	3199	4367	4197	4127	2981	2804	2579	2868	2820	2565	37,782
1983	2331	3125	3460	4433	5045	4032	3575	2876	3204	3421	2863	2662	41,027
1984	2398	2781	3687	3778	4126	3405	2731	2780	2722	2848	2794	2670	36,720
1985	2494	2717	3169	3347	3807	3975	3173	2848	2820	3017	3039	2794	37,200
1986	2670	2709	3125	3656	4719	3841	3245	3024	2863	3101	2913	2690	38,556
1987	2568	2642	2914	3220	3845	3655	3222	3217	3054	3144	3167	2967	37,615
1988	2802	2804	3072	3438	4084	4081	3432	3205	3093	3076	3101	2925	39,113
1989	2821	2769	2993	3397	3891	3297	2616	2686	2754	2975	3035	2750	35,984
1990	2596	2681	3009	3219	3802	3770	2992	2790	2800	2924	2964	2823	36,370
76 - 90 AVG	2,630	2,747	3,122	3,717	4,295	3,808	3,103	2,938	2,905	3,071	2,995	2,790	38,122

SJR @ San Andreas Landing (45)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	258	218	286	808	772	500	362	330	293	322	557	662	5,368
1977	574	547	499	714	906	630	460	450	519	641	765	908	7,613
1978	799	652	439	274	239	221	197	183	174	184	209	282	3,853
1979	444	516	423	387	261	199	178	185	183	191	265	349	3,581
1980	453	431	267	190	182	173	174	178	175	187	209	293	2,912
1981	400	510	483	476	268	192	184	224	248	290	400	488	4,163
1982	519	404	185	209	172	187	160	167	167	174	192	171	2,707
1983	156	180	165	195	179	172	164	156	164	171	166	160	2,028
1984	158	170	171	176	182	175	172	187	192	200	238	295	2,316
1985	456	572	209	344	530	327	247	237	220	276	425	538	4,381
1986	516	442	350	402	197	170	180	186	182	189	210	279	3,303
1987	434	620	544	933	713	329	222	228	251	296	426	674	5,670
1988	576	406	341	434	270	239	278	336	299	323	554	786	4,842
1989	674	504	471	804	778	304	183	182	201	265	416	483	5,265
1990	512	655	628	1048	650	341	286	262	258	323	560	724	6,247
76 - 90 AVG	462	455	364	493	420	277	230	233	235	269	373	473	4,283

SJR @ San Andreas Landing (45)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	158	108	188	806	758	430	263	222	183	220	508	640	4,484
1977	525	480	426	683	915	586	380	366	451	596	750	929	7,087
1978	786	593	349	117	73	66	56	51	48	56	91	182	2,468
1979	376	462	351	272	94	56	46	59	62	69	160	264	2,271
1980	392	365	162	55	49	43	44	49	51	60	89	194	1,553
1981	326	455	423	403	146	60	54	102	129	178	317	430	3,023
1982	468	329	62	62	44	54	38	42	43	48	72	52	1,314
1983	37	54	45	56	48	46	39	36	40	44	40	38	523
1984	39	45	48	44	47	44	43	60	70	80	128	200	848
1985	397	531	91	245	462	207	119	117	98	165	348	490	3,270
1986	460	366	256	304	65	45	48	53	54	60	91	180	1,982
1987	369	589	497	958	681	215	87	89	124	182	340	645	4,776
1988	515	290	236	346	138	96	148	228	190	219	501	787	3,694
1989	652	444	405	799	755	196	57	55	77	154	339	425	4,358
1990	462	630	593	1096	606	232	173	148	148	226	513	714	5,541
76 - 90 AVG	397	383	275	416	325	158	106	112	118	157	286	411	3,146

SJR @ San Andreas Landing (45)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2409	2491	2883	3308	3693	3559	3098	3147	3223	3231	3149	2858	37,049
1977	2833	2929	3106	3498	3797	3687	3232	3199	3380	3545	3588	3313	40,107
1978	3169	3123	3395	4886	5384	4609	3565	3088	2753	3065	2948	2744	42,729
1979	2670	2643	2919	4094	5477	3999	2903	2762	2617	2874	2846	2710	38,514
1980	2573	2532	3021	3841	4854	3849	3027	2843	2744	3064	2963	2766	38,077
1981	2631	2687	2938	3314	3836	3424	2818	2881	3203	3284	3142	2787	36,945
1982	2639	2649	3203	4372	4201	4139	3008	2816	2580	2907	2867	2573	37,954
1983	2344	3129	3451	4436	5048	4031	3578	2879	3209	3086	2803	2566	40,560
1984	2412	2788	3684	3788	4126	3413	2735	2781	2721	2848	2794	2670	36,760
1985	2548	2739	3174	3339	3800	4007	3237	2957	3097	3178	3127	2840	38,043
1986	2776	2808	3155	3666	4724	3842	3250	3026	2864	3122	2925	2691	38,849
1987	2569	2641	2914	3220	3846	3658	3361	3389	3378	3438	3501	3268	39,183
1988	3097	3081	3168	3465	4107	4314	3567	3185	3163	3244	3289	3054	40,734
1989	2875	2786	3000	3409	3949	3329	2617	2774	3005	3095	3067	2757	36,663
1990	2594	2680	3011	3222	3803	3775	3039	2904	2872	2991	3051	2874	36,816
76 - 90 AVG	2,676	2,780	3,135	3,724	4,310	3,842	3,136	2,975	2,987	3,131	3,071	2,831	38,599

SJR @ San Andreas Landing, 45
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	251	405	875	985	756	484	323	288	274	340	428	458
1977	489	538	584	779	823	521	366	446	453	505	890	865
1978	773	654	447	272	227	219	202	205	182	186	241	306
1979	453	533	1164	727	277	199	190	203	178	198	268	373
1980	433	423	577	221	183	174	183	205	181	179	219	301
1981	471	641	1367	918	343	203	184	194	216	276	356	436
1982	520	450	189	209	174	190	161	172	167	175	218	191
1983	158	179	165	190	179	172	166	158	166	179	167	165
1984	161	165	171	174	182	175	177	192	178	192	234	301
1985	437	543	251	352	519	308	220	205	206	264	378	471
1986	525	479	681	487	200	171	193	210	190	190	231	297
1987	429	620	1375	1239	721	325	228	239	252	294	423	657
1988	539	426	869	621	270	223	232	270	270	336	561	688
1989	551	452	435	763	795	331	186	180	203	270	420	485
1990	478	561	529	899	559	313	235	217	229	326	524	653
Average	445	471	645	589	414	267	216	226	223	261	359	443

SJR @ San Andreas Landing, 45
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	151	334	902	1022	740	413	218	170	155	233	352	395
1977	419	467	519	753	808	452	267	362	378	440	864	881
1978	761	606	363	115	67	64	56	58	51	63	132	213
1979	389	485	1249	685	111	56	54	63	50	78	188	294
1980	369	355	535	92	50	44	49	63	52	54	106	206
1981	413	616	1494	939	238	73	51	58	84	155	261	367
1982	470	384	66	61	45	55	38	43	43	50	104	76
1983	39	53	45	54	48	46	40	37	40	49	42	42
1984	41	43	48	44	46	43	46	56	51	71	124	207
1985	374	496	139	255	451	188	85	70	78	151	292	410
1986	474	415	658	408	66	45	53	64	57	66	119	202
1987	364	591	1503	1330	692	211	89	94	123	178	339	628
1988	482	338	882	575	142	81	87	144	152	231	507	669
1989	501	379	361	749	778	230	60	52	83	162	344	427
1990	421	519	477	918	497	202	112	90	111	226	467	629
Average	378	405	616	533	319	147	87	95	101	147	269	376

SJR @ San Andreas Landing, 45
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2380	2456	2768	3220	3658	3434	3030	3154	3327	3481	3088	2778
1977	2841	2962	3186	3612	3913	3673	3172	3153	3047	3227	3402	3190
1978	3055	3024	3345	4858	5117	4540	3800	3373	2804	2871	2794	2675
1979	2619	2600	2793	4022	5649	4033	3114	3140	2687	2831	2844	2713
1980	2529	2534	2987	3790	4810	3923	3234	3153	2760	2902	2817	2734
1981	2580	2615	2816	3236	3822	3436	2938	3015	3220	3455	3185	2774
1982	2610	2642	3193	4351	4050	4189	3090	2885	2581	2844	2827	2574
1983	2376	3122	3455	4384	5035	4058	3582	2896	3130	3286	2841	2653
1984	2462	2755	3682	3826	4250	3467	2839	2989	2761	2831	2786	2661
1985	2482	2705	3148	3319	3780	3852	3327	3128	3021	3157	3095	2801
1986	2707	2727	3094	3597	4628	3879	3543	3321	2915	2904	2794	2670
1987	2545	2604	2800	3167	3842	3630	3478	3474	3342	3399	3405	3140
1988	2910	2890	3019	3399	3968	4182	3623	3227	3204	3379	3355	2984
1989	2825	2773	2999	3399	3878	3302	2642	2759	2841	3003	3064	2760
1990	2551	2608	2960	3202	3769	3611	3057	3023	2951	3132	3133	2879
Average	2631	2734	3083	3692	4278	3814	3231	3113	2973	3113	3029	2799

SJR @ Vernalis (1)
Existing Conditions
Electrical Conductivity
Units are in mircosiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	525	424	676	746	666	809	700	751	764	847	1305	1262	9,475
1977	584	666	805	980	928	942	736	882	878	1176	1246	1350	11,173
1978	997	882	843	496	307	192	229	274	477	601	636	455	6,389
1979	598	515	794	394	294	272	394	476	592	663	691	950	6,633
1980	805	655	768	169	152	166	333	328	432	477	561	462	5,308
1981	490	496	681	552	648	624	596	714	790	927	951	1150	8,619
1982	800	774	631	269	163	155	174	205	284	393	492	373	4,713
1983	301	209	162	155	152	153	159	165	170	217	339	354	2,536
1984	368	182	153	169	262	344	453	615	596	618	694	887	5,341
1985	848	650	770	829	706	681	579	701	764	920	1148	1138	9,736
1986	805	768	784	691	154	152	262	304	351	601	629	781	6,282
1987	615	510	721	812	714	745	701	739	734	847	1263	1238	9,639
1988	979	904	999	1000	939	908	695	811	872	1163	1333	1270	11,873
1989	1059	953	962	989	962	784	664	816	823	978	1316	1284	11,590
1990	1049	936	1038	989	971	679	762	847	866	1162	1442	1344	12,285
76 - 90 AVG	722	635	719	616	535	520	496	575	626	773	936	953	8,106

SJR @ Vernalis (1)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	214	160	294	331	289	364	307	338	348	394	642	611	4,292
1977	246	289	363	456	428	435	327	407	410	577	612	662	5,212
1978	467	404	383	199	98	37	57	81	191	259	277	178	2,631
1979	254	209	357	144	91	79	144	189	254	293	307	446	2,767
1980	363	283	343	31	31	30	112	110	167	191	236	182	2,079
1981	196	199	297	228	279	266	252	318	362	438	448	554	3,837
1982	360	347	271	78	30	32	30	44	87	146	199	133	1,757
1983	95	46	31	32	31	31	30	31	31	51	116	123	648
1984	131	32	32	30	74	118	176	264	255	268	308	412	2,100
1985	386	281	344	375	311	297	243	311	347	434	556	547	4,432
1986	364	343	352	302	32	31	74	97	123	259	273	353	2,603
1987	263	206	318	366	314	330	308	331	331	394	621	602	4,384
1988	456	416	466	466	434	417	305	370	407	570	660	620	5,587
1989	500	441	446	460	446	351	288	373	380	467	650	621	5,423
1990	493	432	487	460	451	402	341	387	404	570	720	661	5,808
76 - 90 AVG	319	273	319	264	223	215	200	243	273	354	442	447	3,571

SJR @ Vernalis (1)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3706	2902	3701	4199	5792	4587	4311	3187	4155	3643	3733	4292	48,208
1977	3709	2905	3702	4200	5795	4586	4315	3165	4201	3639	3764	4350	48,531
1978	3737	2903	3706	4198	5795	4598	4301	3110	4065	3517	3498	4222	47,650
1979	3720	2904	3700	4199	5798	4599	4302	3131	4100	3540	3515	4294	47,802
1980	3708	2903	3703	4200	5797	4600	4302	3115	4056	3472	3477	4224	47,557
1981	3712	2900	3702	4199	5799	4599	4307	3173	4168	3667	3606	4329	48,161
1982	3707	2917	3706	4199	5799	4598	4300	3106	4024	3455	3461	4208	47,480
1983	3702	2906	3701	4199	5797	4598	4300	3104	4010	3419	3431	4212	47,379
1984	3706	2903	3703	4200	5799	4599	4304	3156	4096	3528	3516	4290	47,800
1985	3708	2917	3707	4200	5799	4599	4307	3170	4148	3661	3688	4321	48,225
1986	3720	2907	3704	4199	5794	4589	4300	3113	4038	3517	3496	4249	47,636
1987	3721	2906	3701	4200	5794	4592	4313	3180	4150	3641	3766	4351	48,315
1988	3726	2906	3706	4199	5797	4593	4309	3180	4196	3835	3823	4365	48,635
1989	3742	2904	3704	4200	5798	4599	4311	3199	4184	3717	3795	4256	48,409
1990	3709	2906	3700	4200	5797	4593	4314	3142	4202	3840	3888	4387	48,678
76 - 90 AVG	3,716	2,906	3,703	4,199	5,797	4,596	4,306	3,149	4,120	3,619	3,630	4,290	48,031

SJR @ Vernalis (1)
No-Action Alternative
Electrical Conductivity
Units are in mircosiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	532	433	648	719	658	718	738	792	727	743	728	1030	9,475
1,977	579	632	800	953	928	856	889	870	916	996	1076	1048	11,173
1,978	951	817	774	471	301	187	228	270	464	593	636	443	6,389
1,979	592	492	688	376	288	266	400	476	584	658	695	781	6,633
1,980	753	651	656	177	136	164	330	327	428	480	527	462	5,308
1,981	501	486	683	528	619	606	705	718	727	701	717	894	8,619
1,982	800	739	650	266	166	153	173	204	276	405	473	372	4,713
1,983	306	204	160	131	103	90	158	165	168	220	326	349	2,536
1,984	358	181	151	169	266	335	407	477	598	608	619	752	5,341
1,985	854	625	667	762	673	633	703	714	709	698	742	887	9,736
1,986	805	758	739	737	135	122	262	301	338	608	612	748	6,282
1,987	609	517	692	763	682	675	728	771	734	743	754	950	9,639
1,988	987	861	980	973	953	879	800	853	916	1204	1120	1100	11,873
1,989	1249	927	945	971	935	763	770	889	982	863	1056	945	11,590
1,990	1146	919	1039	962	920	853	801	877	943	1080	1172	990	12,295
76 - 90 AVG	735	616	683	597	518	487	539	580	634	707	750	783	8,106

SJR @ Vernalis (1)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	263	192	222	298	296	298	322	346	344	333	330	406	4,292
1,977	364	257	316	401	435	410	399	403	417	454	497	509	5,212
1,978	470	405	358	266	138	64	44	68	134	221	265	223	2,631
1,979	211	223	248	218	110	82	112	170	222	270	298	331	2,767
1,980	343	308	283	157	31	30	71	110	138	179	205	199	2,079
1,981	191	197	240	251	239	261	285	316	324	320	317	369	3,837
1,982	386	345	305	178	52	32	30	37	64	119	171	159	1,757
1,983	115	71	37	32	31	31	30	31	31	42	82	115	648
1,984	123	78	32	30	52	93	133	172	225	260	264	304	2,100
1,985	362	329	279	314	316	282	292	314	318	314	323	373	4,432
1,986	386	351	333	328	179	31	52	85	107	193	262	299	2,603
1,987	297	234	256	321	319	296	309	336	340	335	338	394	4,384
1,988	452	426	425	454	440	416	381	377	413	514	569	538	5,587
1,989	565	515	433	443	441	386	345	380	441	435	455	474	5,423
1,990	492	484	455	467	435	406	375	381	427	486	547	522	5,808
76 - 90 AVG	335	294	281	277	234	208	212	235	263	298	328	348	3,571

SJR @ Vernalis (1)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	3706	2903	3701	4199	5792	4589	4312	3196	4141	3591	3516	4263	48,208
1,977	3709	2904	3702	4200	5795	4588	4321	3164	4218	3722	3677	4295	48,531
1,978	3733	2903	3705	4199	5795	4598	4301	3110	4062	3515	3498	4222	47,650
1,979	3719	2904	3700	4199	5798	4599	4302	3131	4098	3538	3514	4267	47,802
1,980	3707	2903	3702	4200	5797	4600	4302	3115	4055	3473	3469	4224	47,557
1,981	3712	2900	3702	4199	5799	4599	4309	3174	4144	3561	3523	4282	48,161
1,982	3707	2916	3706	4199	5799	4598	4300	3106	4023	3458	3457	4208	47,480
1,983	3702	2906	3701	4199	5797	4598	4300	3104	4010	3420	3429	4212	47,379
1,984	3705	2903	3703	4200	5799	4599	4304	3135	4097	3524	3495	4266	47,800
1,985	3708	2916	3705	4200	5799	4599	4311	3173	4130	3558	3529	4276	48,225
1,986	3719	2907	3704	4199	5793	4599	4300	3113	4036	3519	3492	4245	47,636
1,987	3721	2906	3700	4200	5794	4593	4314	3187	4150	3590	3543	4291	48,315
1,988	3724	2906	3706	4199	5797	4593	4312	3188	4215	3864	3707	4327	48,635
1,989	3751	2904	3704	4200	5798	4599	4314	3198	4254	3654	3663	4233	48,409
1,990	3711	2906	3700	4200	5797	4593	4316	3145	4236	3784	3731	4307	48,678
76 - 90 AVG	3,716	2,906	3,703	4,199	5,797	4,596	4,308	3,149	4,125	3,585	3,550	4,261	48,031

SJR @ Vernalis (1)
State Permit
Electrical Conductivity
Units are in mircosiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	533	433	648	719	642	718	738	792	726	743	728	1030	8,450
1977	579	632	800	953	928	855	889	870	916	995	1077	1048	10,542
1978	952	817	774	471	300	187	228	270	465	593	636	443	6,136
1979	592	492	688	376	288	266	400	476	584	657	694	781	6,294
1980	753	652	655	177	152	164	330	327	428	481	527	462	5,108
1981	501	486	662	529	620	606	705	717	726	701	717	894	7,864
1982	800	740	650	266	166	153	173	204	276	406	473	372	4,679
1983	306	204	160	155	152	153	158	165	168	220	327	349	2,517
1984	358	181	153	169	260	335	406	477	598	607	619	752	4,915
1985	855	624	667	763	673	633	703	714	709	698	743	888	8,670
1986	805	758	740	737	154	152	262	301	338	607	613	748	6,215
1987	609	517	692	763	682	675	728	771	734	743	754	950	8,618
1988	988	861	980	972	930	879	800	853	916	1203	1121	1101	11,604
1989	1249	927	945	970	936	763	770	811	982	863	1056	945	11,217
1990	1147	920	1036	962	920	852	802	876	944	1080	1172	991	11,704
76 - 90 AVG	735	616	683	599	520	493	539	575	634	706	750	784	7,636

SJR @ Vernalis (1)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	218	165	279	317	276	316	328	361	327	337	326	486	3,736
1977	243	271	360	441	428	389	409	400	431	476	518	498	4,864
1978	443	369	347	185	94	34	56	79	184	254	277	172	2,494
1979	251	196	300	135	88	76	147	189	249	290	308	354	2,583
1980	335	281	283	31	31	30	110	109	164	193	217	182	1,966
1981	202	193	287	216	264	257	310	320	327	314	321	415	3,426
1982	360	329	281	76	30	32	30	43	82	153	188	133	1,737
1983	98	43	31	32	31	31	30	31	31	53	110	121	642
1984	125	31	32	30	73	113	151	190	256	262	268	339	1,870
1985	389	269	290	340	292	271	309	318	317	312	335	411	3,852
1986	364	338	328	326	32	31	74	95	116	262	264	335	2,565
1987	260	210	302	340	297	293	323	349	331	337	341	446	3,829
1988	461	393	456	451	429	401	361	392	431	592	543	528	5,438
1989	602	428	437	450	432	340	345	371	468	403	506	439	5,221
1990	545	424	487	446	423	387	362	403	447	524	571	468	5,487
76 - 90 AVG	326	263	300	254	215	200	223	243	277	317	340	355	3,314

SJR @ Vernalis (1)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3706	2903	3701	4199	5792	4589	4312	3196	4141	3591	3516	4263	47,909
1977	3709	2904	3702	4200	5795	4588	4321	3164	4218	3722	3677	4295	48,295
1978	3733	2903	3705	4199	5795	4598	4301	3110	4062	3515	3498	4222	47,641
1979	3719	2904	3700	4199	5798	4599	4302	3131	4098	3538	3514	4267	47,769
1980	3707	2903	3702	4200	5797	4600	4302	3115	4055	3473	3469	4224	47,547
1981	3712	2900	3702	4199	5799	4599	4309	3174	4144	3561	3523	4281	47,903
1982	3707	2916	3706	4199	5799	4598	4300	3106	4023	3458	3457	4208	47,477
1983	3702	2906	3701	4199	5797	4598	4300	3104	4010	3420	3429	4212	47,378
1984	3705	2903	3703	4200	5799	4599	4304	3135	4097	3524	3495	4266	47,730
1985	3708	2916	3705	4200	5799	4599	4311	3173	4130	3558	3529	4276	47,904
1986	3719	2907	3704	4199	5793	4599	4300	3113	4036	3519	3492	4245	47,626
1987	3721	2906	3700	4200	5794	4593	4314	3187	4150	3591	3543	4291	47,990
1988	3724	2906	3706	4199	5797	4593	4312	3188	4215	3864	3707	4327	48,538
1989	3751	2904	3704	4200	5798	4599	4314	3198	4254	3654	3663	4233	48,272
1990	3711	2906	3700	4200	5797	4593	4316	3145	4236	3784	3731	4307	48,426
76 - 90 AVG	3,716	2,906	3,703	4,199	5,797	4,596	4,308	3,149	4,125	3,585	3,550	4,261	47,894

SJR @ Vernalis (1)
Percent Inflow
Electrical Conductivity
Units are in mircosiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	533	433	648	719	642	718	738	792	726	743	728	1030	8,450
1977	579	632	800	953	928	855	889	870	916	995	1077	1048	10,542
1978	952	817	774	471	300	187	228	270	465	593	636	443	6,136
1979	592	492	686	376	288	266	400	476	584	657	694	781	6,294
1980	753	652	655	177	152	164	330	327	428	481	527	462	5,108
1981	501	486	662	529	620	606	705	717	726	701	717	894	7,864
1982	800	740	650	266	166	153	173	204	276	406	473	372	4,679
1983	306	204	160	155	152	153	158	165	168	220	327	349	2,517
1984	358	181	153	169	260	335	406	477	598	607	619	752	4,915
1985	855	624	667	763	673	633	703	714	709	698	743	888	8,670
1986	805	758	740	737	154	152	262	301	338	607	613	748	6,215
1987	609	517	692	763	682	675	728	771	734	743	754	950	8,618
1988	988	861	980	972	930	879	800	853	916	1203	1121	1101	11,604
1989	1249	927	945	970	936	763	770	811	982	863	1056	945	11,217
1990	1147	920	1038	962	920	852	802	876	944	1080	1172	991	11,704
76 - 90 AVG	735	616	683	599	520	493	539	575	634	706	750	784	7,636

SJR @ Vernalis (1)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	218	165	279	317	276	316	328	361	327	337	326	486	3,736
1977	243	271	360	441	428	389	409	400	431	476	518	498	4,864
1978	443	369	347	185	94	34	56	79	184	254	277	172	2,494
1979	251	196	300	135	88	76	147	189	249	290	308	354	2,583
1980	335	281	283	31	31	30	110	109	184	193	217	182	1,966
1981	202	193	287	216	264	257	310	320	327	314	321	415	3,426
1982	360	329	281	76	30	32	30	43	82	153	188	133	1,737
1983	98	43	31	32	31	31	30	31	31	53	110	121	642
1984	125	31	32	30	73	113	151	190	256	262	268	339	1,870
1985	389	268	290	340	292	271	309	318	317	312	335	411	3,852
1986	364	338	328	326	32	31	74	95	116	262	264	335	2,565
1987	260	210	302	340	297	293	323	349	331	337	341	446	3,829
1988	461	393	458	451	429	401	361	392	431	592	543	528	5,438
1989	602	428	437	450	432	340	345	371	488	403	506	439	5,221
1990	545	424	487	446	423	387	362	403	447	524	571	468	5,487
76 - 90 AVG	326	263	300	254	215	200	223	243	277	317	340	355	3,314

SJR @ Vernalis (1)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3706	2903	3701	4199	5792	4589	4312	3196	4141	3691	3516	4263	47,909
1977	3709	2904	3702	4200	5795	4588	4321	3164	4218	3722	3677	4295	48,295
1978	3733	2903	3705	4199	5795	4598	4301	3110	4062	3515	3498	4222	47,641
1979	3719	2904	3700	4199	5798	4599	4302	3131	4098	3538	3514	4267	47,769
1980	3707	2903	3702	4200	5797	4600	4302	3115	4055	3473	3469	4224	47,547
1981	3712	2900	3702	4199	5799	4599	4309	3174	4144	3561	3523	4281	47,903
1982	3707	2916	3706	4199	5799	4598	4300	3106	4023	3458	3457	4208	47,477
1983	3702	2906	3701	4199	5797	4598	4300	3104	4010	3420	3429	4212	47,378
1984	3705	2903	3703	4200	5799	4599	4304	3135	4097	3524	3495	4266	47,730
1985	3708	2916	3705	4200	5799	4599	4311	3173	4130	3558	3529	4276	47,904
1986	3719	2907	3704	4199	5793	4599	4300	3113	4036	3519	3492	4245	47,626
1987	3721	2906	3700	4200	5794	4593	4314	3187	4150	3591	3543	4291	47,990
1988	3724	2906	3706	4199	5797	4593	4312	3188	4215	3864	3707	4327	48,538
1989	3751	2904	3704	4200	5798	4599	4314	3198	4254	3654	3663	4233	48,272
1990	3711	2906	3700	4200	5797	4593	4316	3145	4236	3784	3731	4307	48,426
76 - 90 AVG	3,716	2,906	3,703	4,199	5,797	4,596	4,308	3,149	4,125	3,585	3,550	4,261	47,894

SJR @ Vernalis (1)
Flow Study
Electrical Conductivity
Units are in mircosiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	533	433	648	719	642	718	738	792	726	743	728	1030	8,450
1977	579	632	800	953	928	855	889	870	916	995	1077	1048	10,542
1978	952	817	774	471	300	187	228	270	465	593	636	443	6,136
1979	592	492	688	376	288	266	400	476	584	657	694	781	6,294
1980	753	852	655	177	152	164	330	327	428	481	527	462	5,108
1981	501	486	662	529	620	606	705	717	726	701	717	894	7,864
1982	800	740	650	266	166	153	173	204	276	406	473	372	4,679
1983	306	204	160	155	152	153	158	165	169	220	327	349	2,517
1984	358	181	153	169	260	335	406	477	598	607	619	752	4,915
1985	855	624	667	763	673	633	703	714	709	698	743	888	8,670
1986	805	758	740	737	154	152	262	301	338	607	613	748	6,215
1987	609	517	692	763	682	675	728	771	734	743	754	950	8,618
1988	988	861	980	972	930	879	800	853	916	1203	1121	1101	11,604
1989	1249	927	945	970	936	763	770	811	982	863	1056	945	11,217
1990	1147	920	1038	962	920	852	802	876	944	1080	1172	991	11,704
76 - 90 AVG	735	616	683	599	520	493	539	575	634	706	750	784	7,636

SJR @ Vernalis (1)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	218	165	279	317	276	316	328	361	327	337	326	486	3,736
1977	243	271	360	441	428	389	409	400	431	476	518	498	4,864
1978	443	369	347	185	94	34	56	79	184	254	277	172	2,494
1979	251	196	300	135	88	76	147	189	249	290	308	354	2,583
1980	335	281	283	31	31	30	110	109	164	193	217	182	1,966
1981	202	193	287	216	264	257	310	320	327	314	321	415	3,426
1982	360	329	281	76	30	32	30	43	62	153	188	133	1,737
1983	98	43	31	32	31	31	30	31	31	53	110	121	642
1984	125	31	32	30	73	113	151	190	256	262	268	339	1,870
1985	389	268	290	340	292	271	309	318	317	312	335	411	3,852
1986	364	338	328	326	32	31	74	95	116	262	264	335	2,565
1987	260	210	302	340	297	293	323	349	331	337	341	446	3,829
1988	461	393	456	451	429	401	361	392	431	592	543	528	5,438
1989	602	428	437	450	432	340	345	371	468	403	506	439	5,221
1990	545	424	487	446	423	387	362	403	447	524	571	468	5,487
76 - 90 AVG	326	263	300	254	215	200	223	243	277	317	340	355	3,314

SJR @ Vernalis (1)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3706	2903	3701	4199	5792	4589	4312	3196	4141	3591	3516	4263	47,909
1977	3709	2904	3702	4200	5795	4588	4321	3164	4218	3722	3677	4295	48,295
1978	3733	2903	3705	4199	5795	4598	4301	3110	4062	3515	3498	4222	47,641
1979	3719	2904	3700	4199	5798	4599	4302	3131	4098	3538	3514	4267	47,769
1980	3707	2903	3702	4200	5797	4600	4302	3115	4055	3473	3469	4224	47,547
1981	3712	2900	3702	4199	5799	4599	4309	3174	4144	3561	3523	4281	47,903
1982	3707	2916	3706	4199	5799	4598	4300	3106	4023	3458	3457	4208	47,477
1983	3702	2906	3701	4199	5797	4598	4300	3104	4010	3420	3429	4212	47,378
1984	3705	2903	3703	4200	5799	4599	4304	3135	4097	3524	3495	4266	47,730
1985	3708	2916	3705	4200	5799	4599	4311	3173	4130	3558	3529	4276	47,904
1986	3719	2907	3704	4199	5793	4599	4300	3113	4036	3519	3492	4245	47,626
1987	3721	2906	3700	4200	5794	4593	4314	3187	4150	3591	3543	4291	47,990
1988	3724	2906	3706	4199	5797	4593	4312	3188	4215	3864	3707	4327	48,538
1989	3751	2904	3704	4200	5798	4599	4314	3198	4254	3654	3663	4233	48,272
1990	3711	2906	3700	4200	5797	4593	4316	3145	4236	3784	3731	4307	48,426
76 - 90 AVG	3,716	2,906	3,703	4,199	5,797	4,596	4,308	3,149	4,125	3,585	3,550	4,261	47,894

SJR @ Vernalis (1)
Maximum Flow
Electrical Conductivity
Units are in mircosiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	533	433	648	719	642	718	738	792	726	743	728	1030	8,450
1977	579	632	800	953	928	855	889	870	916	995	1077	1048	10,542
1978	952	817	774	471	300	187	228	270	465	593	636	443	6,136
1979	592	492	688	376	288	266	400	476	584	657	694	781	6,294
1980	753	652	655	177	152	164	330	327	428	481	527	462	5,108
1981	501	486	662	529	620	606	705	717	726	701	717	894	7,864
1982	800	740	650	266	166	153	173	204	276	406	473	372	4,679
1983	306	204	160	155	152	153	158	165	168	220	327	349	2,517
1984	358	181	153	169	260	335	406	477	598	607	619	752	4,915
1985	855	624	667	763	673	633	703	714	709	698	743	888	8,670
1986	805	758	740	737	154	152	262	301	338	607	613	748	6,215
1987	609	517	692	763	682	675	728	771	734	743	754	950	8,618
1988	988	861	980	972	930	879	800	853	916	1203	1121	1101	11,604
1989	1249	927	945	970	936	763	770	811	982	863	1056	945	11,217
1990	1147	920	1038	962	920	852	802	876	944	1060	1172	991	11,704
76 - 90 AVG	735	616	683	599	520	493	539	575	634	706	750	784	7,636

SJR @ Vernalis (1)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	218	165	279	317	276	316	328	361	327	337	326	486	3,736
1977	243	271	360	441	428	389	409	400	431	476	518	498	4,864
1978	443	369	347	185	94	34	56	79	184	254	277	172	2,494
1979	251	196	300	135	88	76	147	189	249	290	308	354	2,583
1980	335	281	283	31	31	30	110	109	164	193	217	182	1,966
1981	202	193	287	216	264	257	310	320	327	314	321	415	3,426
1982	360	329	281	76	30	32	30	43	82	153	188	133	1,737
1983	98	43	31	32	31	31	30	31	31	53	110	121	642
1984	125	31	32	30	73	113	151	190	256	262	268	339	1,870
1985	389	268	290	340	292	271	309	318	317	312	335	411	3,852
1986	364	338	328	326	32	31	74	96	116	262	264	335	2,565
1987	260	210	302	340	297	293	323	349	331	337	341	446	3,829
1988	461	393	456	451	429	401	361	392	431	592	543	528	5,438
1989	602	428	437	450	432	340	345	371	468	403	506	439	5,221
1990	545	424	487	446	423	387	362	403	447	524	571	468	5,487
76 - 90 AVG	326	263	300	254	215	200	223	243	277	317	340	355	3,314

SJR @ Vernalis (1)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3706	2903	3701	4199	5792	4589	4312	3196	4141	3591	3518	4263	47,909
1977	3709	2904	3702	4200	5795	4588	4321	3164	4218	3722	3677	4295	48,295
1978	3733	2903	3705	4199	5795	4598	4301	3110	4062	3515	3498	4222	47,641
1979	3719	2904	3700	4199	5798	4599	4302	3131	4098	3538	3514	4267	47,769
1980	3707	2903	3702	4200	5797	4600	4302	3115	4055	3473	3469	4224	47,547
1981	3712	2900	3702	4199	5799	4599	4309	3174	4144	3561	3523	4281	47,903
1982	3707	2916	3706	4199	5799	4598	4300	3106	4023	3458	3457	4208	47,477
1983	3702	2906	3701	4199	5797	4598	4300	3104	4010	3420	3429	4212	47,378
1984	3705	2903	3703	4200	5799	4599	4304	3135	4097	3524	3495	4266	47,730
1985	3708	2916	3705	4200	5799	4599	4311	3173	4130	3558	3529	4276	47,904
1986	3719	2907	3704	4199	5793	4599	4300	3113	4036	3519	3492	4245	47,626
1987	3721	2906	3700	4200	5794	4593	4314	3187	4150	3591	3543	4291	47,990
1988	3724	2906	3706	4199	5797	4593	4312	3188	4215	3864	3707	4327	48,538
1989	3751	2904	3704	4200	5798	4598	4314	3198	4254	3654	3663	4233	48,272
1990	3711	2906	3700	4200	5797	4593	4316	3145	4236	3784	3731	4307	48,426
76 - 90 AVG	3,716	2,906	3,703	4,199	5,797	4,596	4,308	3,149	4,125	3,585	3,550	4,261	47,894

SJR @ Vernalis, 1
Cumulative Impact
Electrical Conductivity
Units are in mircosiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	755	581	742	769	723	755	611	610	739	869	1025	1004
1977	526	659	767	932	959	952	760	758	925	1146	1224	1117
1978	861	868	810	484	305	190	213	246	436	587	661	613
1979	605	613	754	382	251	276	347	386	636	665	685	779
1980	684	739	714	202	152	167	312	298	375	629	651	532
1981	610	579	750	605	536	618	486	481	699	709	717	927
1982	698	733	732	267	197	153	172	209	281	578	596	440
1983	237	212	154	154	152	153	163	168	175	246	399	352
1984	232	184	152	159	231	373	411	406	534	613	623	734
1985	690	710	704	746	666	646	587	541	694	730	926	930
1986	711	747	736	761	168	152	256	287	328	606	617	726
1987	751	718	775	775	717	703	606	604	726	948	1005	993
1988	877	886	929	950	952	928	730	744	831	1128	1093	1038
1989	942	952	912	978	949	801	723	770	799	1027	1062	1034
1990	927	927	985	980	960	919	771	818	919	1082	1134	1080
Average	674	674	708	610	526	519	477	488	607	771	828	820

SJR @ Vernalis, 1
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	337	244	329	343	319	336	260	262	334	407	488	472
1977	215	286	343	430	445	440	339	340	436	561	599	535
1978	394	396	366	192	97	35	48	66	169	251	290	263
1979	258	261	335	138	68	82	119	141	278	294	303	353
1980	299	328	315	42	31	30	101	94	136	274	285	219
1981	260	242	334	256	220	263	193	192	312	318	320	433
1982	306	326	325	77	39	32	30	46	85	247	255	169
1983	61	48	31	32	31	31	30	31	31	67	149	123
1984	58	33	32	30	58	133	154	152	222	265	270	329
1985	302	314	309	331	289	278	247	224	309	330	435	434
1986	314	332	326	339	33	31	71	88	111	261	267	323
1987	336	317	347	347	316	308	258	259	328	450	478	469
1988	402	406	429	440	441	428	323	334	384	550	527	494
1989	438	441	420	455	439	360	320	348	367	495	510	486
1990	428	428	458	455	445	423	345	371	433	525	550	517
Average	294	293	313	260	218	214	189	197	262	353	382	375

SJR @ Vernalis, 1
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3709	2904	3701	4199	5791	4588	4309	3160	4145	3654	3614	4260
1977	3707	2905	3702	4200	5795	4586	4316	3149	4221	3818	3752	4306
1978	3730	2903	3705	4198	5795	4598	4301	3109	4055	3513	3506	4237
1979	3720	2905	3700	4199	5798	4599	4301	3121	4114	3541	3513	4266
1980	3706	2904	3702	4200	5797	4600	4302	3113	4043	3519	3501	4231
1981	3716	2901	3702	4199	5799	4599	4305	3136	4134	3564	3523	4287
1982	3706	2918	3707	4199	5799	4598	4300	3107	4024	3509	3486	4210
1983	3702	2907	3701	4199	5797	4599	4300	3104	4011	3424	3441	4212
1984	3703	2903	3703	4200	5799	4599	4304	3126	4079	3525	3496	4264
1985	3706	2920	3706	4200	5799	4599	4308	3145	4124	3571	3594	4283
1986	3716	2907	3704	4199	5790	4599	4300	3111	4034	3518	3493	4242
1987	3728	2910	3701	4200	5793	4593	4310	3156	4148	3696	3641	4300
1988	3722	2906	3706	4199	5797	4593	4310	3169	4179	3811	3893	4315
1989	3735	2904	3704	4200	5798	4599	4313	3189	4174	3748	3667	4238
1990	3708	2906	3700	4200	5797	4592	4315	3139	4226	3785	3712	4325
Average	3714	2907	3703	4199	5796	4596	4306	3136	4114	3613	3575	4265

SJR @ Brandt Bridge (10)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	535	427	646	755	682	803	715	749	764	817	576	1240	8,709
1977	613	662	791	939	989	953	761	866	874	1042	1109	1318	10,917
1978	1028	890	871	531	316	197	230	274	477	597	635	461	6,507
1979	593	519	761	414	299	273	394	477	589	659	681	933	6,592
1980	814	663	691	186	153	166	332	329	433	479	559	465	5,270
1981	490	497	654	565	646	633	602	707	777	599	378	1108	7,656
1982	822	775	671	285	165	157	174	206	285	393	490	378	4,801
1983	304	211	163	159	153	156	160	165	171	218	338	354	2,552
1984	368	188	153	170	262	345	453	606	601	620	662	874	5,302
1985	851	660	708	768	734	695	590	695	757	605	367	1104	8,534
1986	828	771	830	876	176	153	260	304	352	597	628	772	6,547
1987	622	514	581	716	755	836	716	739	737	726	473	1191	8,608
1988	1001	909	871	709	910	922	722	798	857	769	539	1242	10,249
1989	1076	961	962	1017	976	989	695	778	812	562	379	1229	10,436
1990	1069	945	1013	849	930	904	790	837	857	698	437	1299	10,628
76 - 90 AVG	734	639	691	596	543	545	506	569	623	625	550	931	7,554

SJR @ Brandt Bridge (10)
Existing Conditions
Bromide
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	220	162	279	336	297	360	316	341	353	395	315	605	3,979
1977	262	288	356	435	460	440	341	401	414	523	570	651	5,141
1978	486	408	406	218	103	39	57	82	193	260	282	182	2,716
1979	252	211	341	155	93	80	144	191	255	296	326	440	2,784
1980	369	288	318	41	32	30	112	111	169	194	238	185	2,087
1981	197	199	284	235	277	271	255	317	365	321	214	537	3,472
1982	373	349	296	87	31	33	30	45	88	147	199	136	1,814
1983	97	48	31	35	32	33	30	31	32	52	117	124	662
1984	131	35	32	30	74	118	176	262	262	275	317	409	2,121
1985	389	288	334	375	326	304	249	311	352	323	205	535	3,991
1986	378	345	404	432	44	32	74	98	124	260	278	349	2,818
1987	268	209	252	335	337	374	316	335	341	380	269	585	4,001
1988	470	419	415	337	421	423	319	367	407	410	308	614	4,910
1989	512	447	449	482	453	456	305	363	395	311	215	599	4,987
1990	505	438	476	404	432	414	356	384	408	376	249	646	5,088
76 - 90 AVG	327	276	312	262	227	227	205	243	277	302	273	440	3,371

SJR @ Brandt Bridge (10)
Existing Conditions
Dissolved Organic Carbon
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3736	2934	3694	4620	5766	5029	4409	3469	4216	4259	5714	4328	52,174
1977	3745	2951	3683	5191	6844	5127	4441	3421	4263	4500	4764	4376	53,306
1978	3819	2973	4111	4342	5756	4638	4308	3136	4102	3654	3681	4213	48,733
1979	3750	2942	3706	4238	5769	4632	4321	3209	4131	3750	4319	4327	49,094
1980	3758	2950	4470	4249	5782	4619	4315	3154	4076	3555	3581	4215	48,724
1981	3736	2933	3705	4255	5756	4610	4367	3409	4296	5434	5850	4350	52,901
1982	3759	2975	3840	4217	5780	4621	4306	3124	4024	3511	3525	4193	47,875
1983	3721	2931	3695	4213	5784	4616	4304	3117	4007	3435	3452	4205	47,480
1984	3731	2928	3698	4202	5787	4633	4334	3344	4128	3734	4364	4328	49,211
1985	3761	2973	5085	8387	6227	4937	4371	3389	4254	5423	5766	4381	58,954
1986	3777	2973	5857	9016	5900	4614	4309	3146	4044	3625	3657	4227	55,145
1987	3760	2944	3896	8230	7012	7533	4560	3441	4241	5423	5896	4453	61,389
1988	3804	2977	4491	8573	6547	5009	4414	3518	4287	5559	5975	4446	59,600
1989	3830	2984	3740	6538	6115	9044	4946	4163	4690	6017	5882	4350	62,299
1990	3775	2981	3778	6857	6313	5024	4552	3419	4314	5574	5916	4502	57,005
76 - 90 AVG	3,764	2,957	4,097	5,809	6,076	5,259	4,417	3,384	4,205	4,497	4,823	4,326	53,593

SJR @ Brandt Bridge (10)													
No-Action Alternative													
Electrical Conductivity													
Units are in microsiemens/centimeter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	622	486	513	700	699	699	730	762	764	733	736	851	8,709
1,977	823	604	702	864	964	915	875	878	880	926	997	1067	10,917
1,978	1008	893	832	648	390	248	206	250	367	526	611	544	6,507
1,979	513	545	546	547	335	279	331	440	530	615	574	727	6,592
1,980	769	707	668	424	158	150	246	330	379	455	504	496	5,270
1,981	481	494	541	610	574	626	656	713	723	719	708	793	7,656
1,982	853	774	730	469	216	164	162	190	242	342	439	424	4,801
1,983	341	258	183	152	117	100	123	162	167	195	273	338	2,552
1,984	354	272	168	159	217	301	373	443	535	607	617	679	5,302
1,985	796	750	665	793	738	684	671	710	714	710	715	805	8,534
1,986	851	785	823	919	449	128	190	283	322	464	612	673	6,547
1,987	684	567	565	708	750	728	707	747	756	737	746	836	8,608
1,988	967	932	804	647	939	934	853	820	869	807	771	1109	10,249
1,989	1161	1111	941	997	966	985	802	815	788	559	431	990	10,436
1,990	1028	1047	960	828	892	907	850	828	868	635	452	1083	10,628
76 - 90 AVG	750	682	643	631	560	522	518	558	594	602	612	761	7,554

SJR @ Brandt Bridge (10)													
No-Action Alternative													
Bromide													
Units are in micograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	267	194	210	307	302	300	324	349	352	349	341	393	3,979
1,977	373	257	309	395	446	420	401	407	418	451	489	512	5,141
1,978	475	410	386	279	141	66	44	69	134	222	278	226	2,716
1,979	209	225	230	225	113	83	111	171	225	289	317	330	2,784
1,980	345	311	295	161	32	30	70	112	140	182	208	201	2,087
1,981	192	197	227	259	239	267	284	320	332	337	331	364	3,472
1,982	389	348	329	184	53	33	30	37	64	120	172	162	1,814
1,983	116	73	37	35	32	33	30	31	32	43	82	116	662
1,984	124	80	32	30	51	93	133	173	228	271	278	302	2,121
1,985	360	335	297	384	329	287	293	319	327	337	329	369	3,991
1,986	390	353	399	462	187	32	52	86	109	190	272	297	2,818
1,987	301	237	243	331	335	319	312	340	351	343	344	388	4,001
1,988	452	431	380	304	431	424	389	379	413	426	421	538	4,910
1,989	558	527	438	472	449	454	362	378	405	312	250	468	4,967
1,990	483	492	448	393	412	416	388	380	425	350	262	523	5,088
76 - 90 AVG	336	298	284	281	237	217	215	237	264	281	291	346	3,371

SJR @ Brandt Bridge (10)													
No-Action Alternative													
Dissolved Organic Carbon													
Units are in micograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	3735	2936	3727	4895	5783	4905	4420	3522	4198	4235	3819	4225	52,174
1,977	3742	2949	3692	5186	6907	5032	4497	3443	4281	4142	4084	4294	53,306
1,978	3802	2967	4188	4313	5757	4636	4308	3136	4096	3637	3893	4214	48,733
1,979	3748	2940	3830	4236	5769	4632	4321	3209	4146	4363	5767	4333	49,094
1,980	3751	2950	3826	4210	5782	4619	4315	3154	4074	3554	3553	4216	48,724
1,981	3736	2933	3782	4315	5781	4948	4432	3415	4231	4051	3990	4264	52,901
1,982	3752	2972	3923	4223	5780	4622	4306	3124	4023	3519	3513	4193	47,875
1,983	3722	2930	3695	4213	5784	4616	4304	3117	4007	3436	3448	4205	47,480
1,984	3730	2928	3698	4202	5787	4633	4327	3220	4138	3847	3852	4274	49,211
1,985	3758	2971	4117	8459	6186	4810	4435	3454	4207	4278	3832	4266	58,954
1,986	3768	2972	5754	10957	5975	4615	4309	3146	4041	3636	3761	4227	55,145
1,987	3759	2945	3896	8281	6647	5561	4459	3469	4241	3921	3773	4290	61,389
1,988	3791	2973	4434	8411	6233	4952	4447	3511	4269	5510	5751	4365	59,600
1,989	3854	2987	3751	6550	6066	8893	5427	3607	5362	6089	6206	4310	62,299
1,990	3782	2981	3771	6826	6366	4996	4696	3514	4503	5843	6173	4379	57,005
76 - 90 AVG	3,762	2,956	4,006	5,952	6,040	5,098	4,467	3,336	4,256	4,271	4,361	4,270	53,593

SJR @ Brandt Bridge (10)													
State Permit													
Electrical Conductivity													
Units are in microsiemens/centimeter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	540	437	610	737	656	722	742	788	734	734	729	998	8,427
1977	598	631	785	938	975	878	890	873	903	964	1033	1047	10,515
1978	960	826	810	498	308	191	226	270	465	589	632	450	6,227
1979	588	496	649	393	292	268	398	478	581	649	616	771	6,179
1980	755	657	669	193	153	165	329	329	429	482	527	465	5,153
1981	500	487	598	545	619	616	701	720	728	706	715	880	7,815
1982	806	743	691	284	169	155	174	205	277	404	473	376	4,757
1983	309	207	162	159	153	156	158	166	169	221	326	350	2,536
1984	359	185	153	170	260	336	407	478	593	613	623	747	4,924
1985	848	636	676	803	699	645	702	716	713	705	736	877	8,756
1986	810	762	818	916	179	153	260	301	340	603	617	741	6,500
1987	616	521	587	710	712	721	732	769	741	742	752	935	8,538
1988	984	870	781	633	910	894	815	847	896	704	715	1091	10,140
1989	1230	953	944	1000	952	981	801	808	796	622	541	934	10,562
1990	1127	937	1014	853	885	873	821	866	868	560	455	986	10,245
76 - 90 AVG	735	623	663	589	528	517	544	574	616	620	633	777	7,418

SJR @ Brandt Bridge (10)													
State Permit													
Bromide													
Units are in micograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	223	168	261	327	284	318	330	363	336	360	337	471	3,778
1977	254	271	353	434	451	400	410	404	431	471	508	501	4,888
1978	449	375	373	200	98	37	56	79	186	256	286	176	2,571
1979	249	199	282	144	90	77	147	191	252	299	333	354	2,617
1980	337	284	295	40	32	30	110	111	167	196	221	184	2,007
1981	202	193	257	225	263	262	308	324	335	325	330	409	3,433
1982	364	332	308	86	31	33	30	44	83	154	190	136	1,791
1983	99	45	31	35	32	33	30	31	32	53	110	122	653
1984	126	34	32	30	73	113	151	192	258	274	280	337	1,900
1985	387	275	302	384	308	277	309	322	326	332	340	408	3,970
1986	368	341	396	460	46	32	74	96	118	264	274	332	2,801
1987	264	213	255	332	314	316	325	351	343	346	348	440	3,847
1988	461	398	369	297	420	409	369	393	430	379	386	528	4,839
1989	595	442	439	474	441	451	362	374	407	345	310	438	5,078
1990	535	433	476	405	408	398	373	400	432	309	262	471	4,902
76 - 90 AVG	328	267	295	258	219	212	226	245	276	291	301	354	3,272

SJR @ Brandt Bridge (10)													
State Permit													
Dissolved Organic Carbon													
Units are in micograms/liter													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3735	2936	3730	4925	5785	4905	4425	3529	4201	4637	3830	4224	50,862
1977	3742	2949	3692	4668	6267	5016	4503	3447	4281	4146	4084	4294	51,089
1978	3802	2967	4133	4309	5757	4636	4308	3136	4095	3645	3882	4213	48,883
1979	3748	2940	3767	4234	5769	4632	4321	3210	4144	4057	5607	4335	50,764
1980	3751	2950	3825	4210	5762	4619	4315	3154	4074	3556	3552	4216	48,004
1981	3736	2934	3781	4315	5781	4854	4433	3415	4227	3868	3846	4264	49,454
1982	3752	2972	3919	4223	5780	4622	4306	3124	4023	3519	3513	4193	47,946
1983	3722	2930	3695	4213	5784	4616	4304	3117	4007	3436	3448	4205	47,477
1984	3730	2928	3698	4202	5787	4633	4327	3220	4138	3844	3838	4274	48,619
1985	3759	2971	4113	7808	6134	4833	4434	3427	4206	4159	3804	4266	53,914
1986	3768	2972	5695	10845	5972	4615	4309	3146	4041	3632	3755	4227	56,977
1987	3759	2945	3905	8326	6655	5560	4461	3473	4244	3936	3781	4290	55,335
1988	3791	2973	4455	8490	6228	4952	4455	3506	4324	5578	5619	4361	58,732
1989	3854	2987	3752	6559	6129	9108	5447	3591	5209	6020	6241	4307	63,204
1990	3782	2981	3758	6827	6234	4990	4595	3454	4634	5686	6079	4374	57,394
76 - 90 AVG	3,762	2,956	3,995	5,877	5,990	5,106	4,463	3,330	4,257	4,248	4,325	4,270	52,577

SJR @ Brandt Bridge (10)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	540	437	617	733	656	722	742	789	734	738	730	998	8,436
1977	598	631	785	923	979	878	890	873	903	964	1033	1047	10,504
1978	960	826	813	499	308	191	228	270	465	590	631	450	6,231
1979	588	496	575	392	292	268	398	478	581	644	593	771	6,076
1980	755	657	669	193	153	165	329	329	429	482	527	465	5,153
1981	500	487	598	548	619	618	701	719	728	709	714	880	7,821
1982	806	743	692	284	169	155	174	205	277	404	473	376	4,758
1983	309	207	162	159	153	156	158	166	169	221	326	350	2,536
1984	359	185	153	170	260	336	407	478	593	613	623	747	4,924
1985	848	636	676	786	694	643	702	717	713	704	736	877	8,732
1986	810	762	819	917	179	153	260	301	340	603	617	741	6,502
1987	616	521	587	711	712	721	732	769	740	742	752	935	8,538
1988	984	870	792	642	911	894	814	847	901	850	812	1092	10,409
1989	1230	953	944	1000	950	977	802	808	777	562	434	927	10,364
1990	1127	937	1011	838	865	873	826	866	908	710	505	986	10,452
76 - 90 AVG	735	623	660	586	527	517	544	574	617	636	634	776	7,429

SJR @ Brandt Bridge (10)
Percent Inflow
Bromide
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	223	168	264	325	283	318	330	363	336	353	336	471	3,770
1977	254	271	353	426	454	400	410	404	431	471	508	501	4,883
1978	449	375	376	200	98	37	56	79	186	256	287	176	2,575
1979	249	199	248	144	90	77	147	191	252	304	325	353	2,579
1980	337	284	295	40	32	30	110	111	167	196	220	184	2,006
1981	202	193	257	226	263	263	309	324	335	331	334	409	3,446
1982	364	332	308	86	31	33	30	44	83	154	190	136	1,791
1983	99	45	31	35	32	33	30	31	32	53	110	122	653
1984	126	34	32	30	73	113	151	192	258	274	281	337	1,901
1985	387	275	303	380	305	277	309	323	327	330	339	408	3,963
1986	368	341	397	461	46	32	74	96	118	264	274	332	2,803
1987	264	213	255	332	315	316	325	351	341	345	347	440	3,844
1988	461	398	374	302	420	409	368	393	430	447	438	529	4,969
1989	595	442	439	474	439	450	362	374	399	314	251	434	4,973
1990	535	433	475	398	398	398	376	400	442	388	291	471	5,005
76 - 90 AVG	328	267	294	257	219	212	226	245	276	299	302	354	3,277

SJR @ Brandt Bridge (10)
Percent Inflow
Dissolved Organic Carbon
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3735	2936	3716	4767	5774	4906	4420	3515	4196	4279	3806	4224	50,274
1977	3742	2949	3692	5120	6833	5035	4506	3444	4281	4143	4085	4294	52,124
1978	3802	2967	4185	4313	5757	4636	4308	3136	4095	3634	3894	4214	48,941
1979	3748	2940	3904	4239	5769	4632	4321	3209	4145	4343	5737	4334	51,321
1980	3751	2950	3826	4210	5782	4619	4315	3154	4074	3549	3555	4216	48,001
1981	3736	2933	3783	4349	5784	4905	4431	3407	4230	4050	3988	4264	49,860
1982	3752	2972	3923	4223	5780	4622	4306	3124	4023	3519	3513	4193	47,950
1983	3722	2930	3695	4213	5784	4816	4304	3117	4007	3436	3448	4205	47,477
1984	3730	2928	3698	4202	5787	4633	4327	3220	4138	3844	3839	4274	48,620
1985	3758	2971	4119	8459	6174	4808	4436	3442	4207	4094	3793	4265	54,526
1986	3768	2972	5771	10976	5975	4615	4309	3146	4041	3635	3755	4227	57,190
1987	3759	2945	3904	8340	6656	5558	4453	3458	4233	3884	3753	4289	55,232
1988	3791	2973	4452	8456	6225	4950	4439	3504	4286	5475	5637	4361	58,549
1989	3854	2987	3750	6488	6055	8842	5417	3606	5350	6090	6207	4309	62,955
1990	3782	2981	3769	6823	6453	5000	4694	3465	4407	5758	6174	4378	57,684
76 - 90 AVG	3,762	2,956	4,012	5,945	6,039	5,092	4,466	3,330	4,248	4,249	4,346	4,270	52,714

SJR @ Brandt Bridge (10)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	540	437	611	736	656	722	742	789	734	739	730	998	8,434
1977	598	631	781	923	979	878	890	873	903	964	1033	1047	10,500
1978	960	826	811	498	308	192	228	270	465	590	631	450	6,229
1979	588	496	575	392	292	268	398	478	581	651	632	772	6,123
1980	755	657	669	193	153	165	329	329	429	482	527	465	5,153
1981	500	487	598	548	619	618	701	719	727	706	714	880	7,817
1982	806	743	692	284	169	155	174	205	277	404	473	376	4,758
1983	309	207	162	159	153	156	158	166	169	221	326	350	2,536
1984	359	185	153	170	260	336	407	478	593	613	623	747	4,924
1985	848	636	676	796	696	643	702	716	713	701	734	877	8,738
1986	810	762	820	918	179	153	260	301	340	603	617	741	6,504
1987	816	521	587	711	712	720	732	769	740	742	752	935	8,537
1988	984	870	780	630	910	891	813	847	900	767	691	1090	10,173
1989	1230	953	944	1000	952	981	802	808	817	848	748	938	11,021
1990	1127	937	1008	834	882	873	816	865	912	646	441	984	10,325
76 - 90 AVG	735	623	658	586	528	517	543	574	620	645	645	777	7,451

SJR @ Brandt Bridge (10)
Flow Study
Bromide
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	223	168	262	327	283	318	330	363	338	352	336	471	3,769
1977	254	271	351	426	454	400	410	404	431	471	508	501	4,881
1978	449	375	374	200	98	37	56	79	186	256	287	176	2,573
1979	249	199	248	144	90	77	147	191	252	297	336	354	2,584
1980	337	284	295	40	32	30	110	111	167	196	220	184	2,006
1981	202	193	257	226	263	263	309	324	333	323	331	409	3,433
1982	364	332	308	86	31	33	30	44	83	154	190	136	1,791
1983	99	45	31	35	32	33	30	31	32	53	110	122	653
1984	126	34	32	30	73	113	151	192	258	274	281	337	1,901
1985	387	275	303	385	306	277	309	322	326	322	340	408	3,960
1986	368	341	398	462	46	32	74	96	118	264	274	332	2,805
1987	264	213	255	332	315	315	325	352	341	344	348	440	3,844
1988	461	398	368	296	420	408	368	392	430	408	380	528	4,857
1989	595	442	439	473	441	452	362	375	417	417	406	440	5,259
1990	535	433	474	396	406	398	370	400	442	352	254	470	4,930
76 - 90 AVG	328	267	293	257	219	212	225	245	277	299	307	354	3,283

SJR @ Brandt Bridge (10)
Flow Study
Dissolved Organic Carbon
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3735	2936	3727	4897	5783	4903	4417	3509	4196	4221	3780	4224	50,328
1977	3742	2949	3683	5138	6859	5038	4495	3441	4281	4143	4085	4294	52,148
1978	3802	2967	4142	4310	5757	4636	4308	3136	4095	3634	3895	4214	48,896
1979	3748	2940	3906	4239	5769	4632	4321	3209	4145	3929	5469	4334	50,641
1980	3751	2950	3825	4210	5782	4619	4315	3154	4074	3550	3555	4216	48,001
1981	3736	2933	3782	4348	5786	4906	4431	3408	4214	3830	3907	4264	49,545
1982	3752	2972	3923	4223	5780	4622	4306	3124	4023	3518	3513	4193	47,949
1983	3722	2930	3695	4213	5784	4616	4304	3117	4007	3436	3448	4205	47,477
1984	3730	2928	3698	4202	5787	4633	4327	3220	4138	3844	3839	4274	48,620
1985	3759	2971	4120	8483	6188	4807	4437	3417	4199	3840	3841	4267	54,329
1986	3768	2972	5797	11056	5977	4615	4309	3146	4041	3632	3754	4227	57,294
1987	3759	2945	3905	8354	6661	5541	4450	3448	4228	3851	3792	4291	55,225
1988	3791	2973	4436	8470	6226	4878	4435	3478	4293	5536	5825	4368	58,709
1989	3854	2987	3749	6463	6116	9088	5445	3681	5367	4398	5809	4309	61,276
1990	3782	2981	3778	6808	6250	4990	4501	3475	4389	5688	6130	4377	57,149
76 - 90 AVG	3,762	2,956	4,011	5,961	6,034	5,102	4,453	3,331	4,246	4,070	4,309	4,270	52,506

SJR @ Brandt Bridge (10)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	540	437	610	765	662	721	742	789	734	741	730	998	8,469
1977	598	631	784	931	976	875	890	873	903	964	1033	1047	10,505
1978	960	826	811	498	308	191	228	270	465	590	633	450	6,230
1979	588	496	661	393	292	268	398	477	581	653	673	776	6,256
1980	755	657	669	193	153	165	329	329	429	482	527	465	5,153
1981	500	487	598	546	619	617	701	719	727	705	716	880	7,815
1982	806	743	691	284	169	155	174	205	277	404	473	376	4,757
1983	309	207	162	159	153	156	158	166	169	221	326	350	2,536
1984	359	185	153	170	260	336	407	478	593	613	623	747	4,924
1985	848	636	676	785	694	643	702	716	712	701	736	877	8,726
1986	810	762	819	921	179	153	260	301	340	603	617	741	6,506
1987	616	521	586	707	712	718	732	769	738	742	752	935	8,528
1988	984	870	798	648	911	890	814	847	901	917	995	1096	10,671
1989	1230	953	944	998	950	979	802	809	934	874	789	940	11,202
1990	1127	937	1010	843	883	873	814	867	913	757	551	987	10,562
76 - 90 AVG	735	623	665	589	528	516	543	574	628	664	678	778	7,523

SJR @ Brandt Bridge (10)
Maximum Flow
Bromide
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	223	168	261	347	287	317	330	363	336	344	333	471	3,780
1977	254	271	352	430	452	398	410	404	431	471	508	501	4,882
1978	449	375	374	200	98	37	56	79	186	256	283	176	2,569
1979	249	199	288	144	90	77	147	191	252	295	333	355	2,620
1980	337	284	295	40	32	30	110	111	167	196	220	184	2,006
1981	202	193	257	226	263	263	308	323	333	323	328	409	3,428
1982	364	332	308	86	31	33	30	44	83	154	190	136	1,791
1983	99	45	31	35	32	33	30	31	32	53	110	122	653
1984	126	34	32	30	73	113	151	192	258	274	281	337	1,901
1985	387	275	303	380	305	276	309	322	324	321	339	408	3,949
1986	368	341	397	463	46	32	74	96	118	264	274	332	2,805
1987	264	213	254	330	314	314	325	351	339	343	346	440	3,833
1988	461	398	377	305	421	407	369	392	430	475	514	530	5,079
1989	595	442	439	472	440	451	363	373	453	427	427	441	5,323
1990	535	433	474	400	407	398	369	400	442	410	314	472	5,054
76 - 90 AVG	328	267	296	259	219	212	225	245	279	307	320	354	3,312

SJR @ Brandt Bridge (10)
Maximum Flow
Dissolved Organic Carbon
Units are in micograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3735	2935	3730	6585	5979	4873	4415	3496	4194	3896	3705	4224	51,767
1977	3742	2949	3689	4902	6493	4961	4508	3437	4280	4143	4086	4294	51,484
1978	3802	2967	4154	4310	5757	4636	4308	3136	4095	3634	3738	4212	48,749
1979	3748	2940	3745	4233	5769	4632	4321	3208	4138	3821	4709	4314	49,578
1980	3751	2950	3826	4210	5782	4619	4315	3154	4074	3547	3551	4216	47,995
1981	3736	2934	3782	4327	5780	4882	4440	3394	4204	3804	3768	4264	49,315
1982	3752	2972	3919	4223	5780	4622	4306	3124	4023	3517	3512	4193	47,943
1983	3722	2930	3695	4213	5784	4616	4304	3117	4007	3436	3448	4205	47,477
1984	3730	2928	3698	4202	5787	4633	4327	3220	4138	3843	3839	4274	48,619
1985	3759	2971	4117	8431	6167	4800	4428	3390	4179	3827	3773	4265	54,107
1986	3768	2972	5716	10958	5975	4615	4309	3146	4041	3629	3754	4227	57,110
1987	3759	2945	3886	8211	6640	5487	4444	3445	4212	3830	3718	4288	54,865
1988	3792	2973	4422	8410	6216	4838	4443	3482	4283	5244	4925	4343	57,371
1989	3854	2987	3748	6295	6037	6840	5413	3501	4378	4276	5716	4303	59,348
1990	3782	2981	3771	6756	6255	5002	4461	3405	4368	5618	6097	4376	56,892
76 - 90 AVG	3,762	2,956	3,993	6,018	6,013	5,070	4,451	3,310	4,174	4,004	4,156	4,267	52,175

SJR @ BrandtBridge, 10
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	754	589	624	710	738	768	626	614	729	847	694	997
1977	546	654	760	916	963	961	785	760	872	1042	1096	1122
1978	880	868	883	518	313	195	213	247	436	582	632	615
1979	606	614	640	400	255	278	347	387	614	664	679	774
1980	688	736	765	222	154	168	311	300	376	607	649	537
1981	608	580	611	630	547	621	497	484	686	709	716	909
1982	710	732	780	292	199	156	172	210	282	560	598	449
1983	244	214	155	159	153	155	164	168	176	247	396	354
1984	234	186	153	160	231	373	413	408	531	609	627	730
1985	692	710	752	832	697	658	595	546	684	727	760	924
1986	724	746	813	927	194	153	256	288	329	597	621	720
1987	750	720	725	730	761	788	619	608	719	900	970	990
1988	885	885	861	739	932	935	753	745	820	1019	1000	1038
1989	950	951	923	986	966	974	744	768	792	859	737	1020
1990	935	928	972	844	845	939	792	813	891	968	714	1065
Average	680	674	694	604	530	541	486	490	596	729	726	816

SJR @ BrandtBridge, 10
Cumulative Impact
Bromide
Units are in micograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	337	248	278	333	327	342	268	266	334	403	364	472
1977	226	283	339	422	446	444	354	343	420	523	561	543
1978	406	397	421	211	101	38	48	67	170	254	307	286
1979	259	262	287	147	70	82	119	142	272	315	324	353
1980	302	327	354	53	32	30	100	95	138	267	306	223
1981	260	244	272	272	225	264	199	195	309	324	331	426
1982	314	325	369	91	40	33	30	47	86	242	261	175
1983	64	49	31	34	31	33	30	31	32	68	149	125
1984	60	34	32	30	58	133	154	154	223	274	284	326
1985	304	314	351	409	307	283	252	229	308	335	383	434
1986	321	332	394	466	47	32	71	89	113	266	279	321
1987	336	319	334	346	343	350	265	263	328	435	474	471
1988	408	407	410	354	433	431	336	337	384	507	515	498
1989	444	441	428	466	448	449	332	351	374	440	405	484
1990	433	429	454	401	392	433	357	371	428	489	398	515
Average	298	294	317	269	220	225	194	199	261	343	356	376

SJR @ BrandtBridge, 10
Cumulative Impact
Dissolved Organic Carbon
Units are in micograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3749	2949	4128	8385	6362	5077	4379	3312	4199	3958	5201	4260
1977	3738	2949	3694	4651	5824	4973	4460	3360	4381	4479	4686	4329
1978	3792	2971	4791	4390	5756	4636	4308	3131	4083	3721	4550	4239
1979	3756	2948	4132	4254	5771	4629	4318	3172	4189	4331	4271	4281
1980	3744	2955	4264	4248	5779	4620	4314	3147	4054	3726	4240	4241
1981	3747	2941	4162	4722	5769	4979	4351	3220	4190	3774	3890	4267
1982	3745	2970	4891	4315	5779	4623	4306	3124	4024	3713	3664	4191
1983	3721	2931	3695	4212	5785	4615	4304	3119	4008	3443	3474	4205
1984	3718	2922	3698	4201	5786	4633	4327	3188	4103	3936	3890	4272
1985	3744	2978	4615	8725	6295	4845	4363	3257	4175	3827	4806	4307
1986	3761	2965	5746	11241	5976	4617	4309	3141	4039	3819	3840	4226
1987	3775	2965	4139	8127	7339	6559	4428	3301	4203	4078	4079	4304
1988	3781	2974	4549	8777	6410	4836	4405	3401	4238	4388	4892	4334
1989	3806	2979	3730	6671	6230	9302	4954	3493	4304	5023	5759	4297
1990	3762	2979	3780	6891	7428	5464	4456	3356	4330	4724	5870	4387
Average	3756	2958	4268	6254	6153	5227	4399	3248	4167	4063	4474	4276

Old River @ Middle River (58)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	383	385	670	750	673	808	709	749	764	839	1064	486	8,280
1977	519	578	801	973	935	945	750	873	876	1098	1206	972	10,526
1978	747	753	846	514	316	197	230	275	477	600	636	396	5,987
1979	406	443	783	408	298	274	394	477	590	661	690	416	5,842
1980	453	464	738	187	154	167	332	329	433	479	560	389	4,685
1981	409	435	676	560	648	628	600	711	786	880	892	426	7,651
1982	486	532	633	285	165	158	174	206	285	393	492	377	4,186
1983	303	211	164	159	153	156	160	166	171	218	338	355	2,554
1984	369	187	154	170	262	345	453	611	599	619	691	398	4,858
1985	430	512	746	817	716	686	585	697	762	875	978	450	8,254
1986	494	549	766	699	170	153	261	304	352	599	629	396	5,372
1987	443	479	708	808	723	759	707	739	735	835	1046	519	8,501
1988	515	577	953	931	942	913	707	806	865	1081	1184	672	10,146
1989	607	646	960	990	966	801	673	807	822	927	1041	466	9,706
1990	488	581	1023	960	973	889	772	842	862	1053	1128	620	10,191
76 - 90 AVG	470	489	708	614	540	525	500	573	625	744	838	489	7,116

Old River @ Middle River (58)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	187	176	292	333	292	363	312	339	350	395	533	292	3,864
1977	321	347	366	452	433	437	335	403	413	544	600	550	5,201
1978	563	581	391	208	102	39	57	82	192	260	278	190	2,943
1979	204	233	355	152	93	81	144	191	255	294	308	220	2,530
1980	258	261	334	40	32	31	112	111	169	193	238	186	1,965
1981	209	224	296	233	279	268	254	317	363	424	428	249	3,544
1982	297	324	275	86	32	33	31	45	88	147	200	136	1,694
1983	97	48	31	35	32	33	30	31	32	52	117	125	663
1984	132	35	32	31	74	118	176	264	259	271	309	201	1,902
1985	241	312	340	371	316	300	248	310	349	420	483	263	3,951
1986	306	321	352	307	40	32	74	98	125	260	275	197	2,387
1987	245	272	317	371	318	340	311	333	335	393	525	313	4,073
1988	337	355	450	438	436	419	312	369	407	537	598	417	5,075
1989	462	422	449	462	448	369	294	371	383	450	525	271	4,906
1990	296	357	484	460	452	406	346	385	406	525	578	385	5,080
76 - 90 AVG	277	285	318	265	225	218	202	243	275	344	400	266	3,319

Old River @ Middle River (58)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3949	3963	3739	4307	5773	4720	4369	3335	4186	3804	4347	4378	50,870
1977	4581	5049	3846	4326	5785	4737	4382	3306	4234	4178	4043	4853	53,320
1978	5234	5508	3847	4253	5775	4840	4311	3137	4093	3601	3562	4274	52,235
1979	4436	4138	3812	4262	5791	4638	4325	3189	4124	3643	3598	4168	50,124
1980	4205	3904	3811	4211	5794	4624	4319	3154	4077	3533	3528	4273	49,433
1981	4495	4359	3744	4259	5802	4697	4349	3286	4204	4013	3930	4241	51,379
1982	4387	4340	3768	4229	5792	4632	4307	3124	4029	3498	3501	4201	49,808
1983	3721	2930	3700	4227	5794	4620	4306	3118	4011	3437	3454	4213	47,531
1984	3730	2930	3704	4214	5801	4640	4334	3251	4119	3626	3600	4100	48,049
1985	4048	4482	3937	4581	5801	4716	4349	3280	4177	4000	4194	4321	51,886
1986	4503	4570	3961	4296	5770	4617	4313	3145	4052	3594	3559	4181	50,561
1987	4265	4267	3794	4630	5812	4920	4380	3316	4182	3833	4357	4554	52,310
1988	4714	5001	3898	5104	5809	4734	4355	3313	4232	4234	4342	4806	54,542
1989	4882	4977	3806	4400	5784	5238	4382	3375	4224	4089	4474	4205	53,836
1990	4318	4792	3849	4820	5780	4733	4381	3256	4238	4319	4624	4782	53,892
76 - 90 AVG	4,365	4,347	3,814	4,408	5,791	4,727	4,344	3,239	4,145	3,827	3,941	4,370	51,318

Old River @ Middle River (58)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	383	385	670	750	673	808	709	749	764	839	1064	486	8,280
1977	519	578	801	973	935	945	750	873	876	1098	1206	972	10,526
1978	747	753	846	514	316	197	230	275	477	600	636	396	5,987
1979	406	443	783	408	298	274	394	477	590	661	690	418	5,842
1980	453	464	738	187	154	167	332	329	433	479	560	389	4,685
1981	409	435	676	560	648	628	600	711	786	880	892	426	7,651
1982	486	532	633	285	165	158	174	206	285	393	492	377	4,186
1983	303	211	164	159	153	156	160	166	171	218	338	355	2,554
1984	369	187	154	170	262	345	453	611	599	619	691	398	4,858
1985	430	512	746	817	716	686	585	697	762	875	978	450	8,254
1986	494	549	766	699	170	153	261	304	352	599	629	396	5,372
1987	443	479	708	808	723	759	707	739	735	835	1046	519	8,501
1988	515	577	953	931	942	913	707	806	865	1081	1184	672	10,146
1989	607	646	960	990	966	801	673	807	822	927	1041	486	9,706
1990	488	581	1023	960	973	889	772	842	862	1053	1128	620	10,191
76 - 90 AVG	470	489	708	614	540	525	500	573	625	744	838	489	7,116

Old River @ Middle River (58)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	187	176	292	333	292	363	312	339	350	395	533	292	3,864
1977	321	347	366	452	433	437	335	403	413	544	600	550	5,201
1978	563	581	391	208	102	39	57	82	192	260	278	190	2,943
1979	204	233	355	152	93	81	144	191	255	294	308	220	2,530
1980	258	261	334	40	32	31	112	111	169	193	238	186	1,965
1981	209	224	296	233	279	268	254	317	363	424	428	249	3,544
1982	297	324	275	86	32	33	31	45	88	147	200	136	1,694
1983	97	48	31	35	32	33	30	31	32	52	117	125	663
1984	132	35	32	31	74	118	176	264	259	271	309	201	1,902
1985	241	312	340	371	316	300	248	310	349	420	483	263	3,951
1986	306	321	352	307	40	32	74	98	125	260	275	197	2,387
1987	245	272	317	371	318	340	311	333	335	393	525	313	4,073
1988	337	355	450	438	436	419	312	369	407	537	598	417	5,075
1989	462	422	449	462	448	369	294	371	383	450	525	271	4,906
1990	296	357	484	460	452	406	346	385	406	525	578	385	5,080
76 - 90 AVG	277	285	318	265	225	218	202	243	275	344	400	266	3,319

Old River @ Middle River (58)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3949	3963	3739	4307	5773	4720	4369	3335	4186	3804	4347	4378	50,870
1977	4581	5049	3846	4326	5785	4737	4382	3306	4234	4178	4043	4853	53,320
1978	5234	5508	3847	4253	5775	4640	4311	3137	4093	3601	3562	4274	52,235
1979	4436	4138	3812	4262	5791	4638	4325	3189	4124	3643	3598	4168	50,124
1980	4205	3904	3811	4211	5794	4624	4319	3154	4077	3533	3528	4273	49,433
1981	4495	4359	3744	4259	5802	4697	4349	3286	4204	4013	3930	4241	51,379
1982	4387	4340	3768	4229	5792	4632	4307	3124	4029	3498	3501	4201	49,808
1983	3721	2930	3700	4227	5794	4620	4306	3118	4011	3437	3454	4213	47,531
1984	3730	2930	3704	4214	5801	4640	4334	3251	4119	3626	3600	4100	48,049
1985	4048	4482	3937	4581	5801	4716	4349	3280	4177	4000	4194	4321	51,886
1986	4503	4570	3961	4296	5770	4617	4313	3145	4052	3594	3559	4181	50,561
1987	4265	4267	3794	4630	5812	4920	4380	3316	4182	3833	4357	4554	52,310
1988	4714	5001	3898	5104	5809	4734	4355	3313	4232	4234	4342	4806	54,542
1989	4882	4977	3806	4400	5784	5238	4382	3375	4224	4089	4474	4205	53,836
1990	4318	4792	3849	4820	5780	4733	4381	3256	4238	4319	4624	4782	53,892
76 - 90 AVG	4,365	4,347	3,814	4,408	5,791	4,727	4,344	3,239	4,145	3,827	3,941	4,370	51,318

Old River @ Middle River (58)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	383	372	642	725	648	720	740	790	730	742	729	480	7,701
1977	524	569	794	948	934	864	890	871	909	977	1054	904	10,238
1978	758	763	779	486	308	192	229	271	464	592	635	391	5,868
1979	430	467	680	388	293	268	399	477	583	656	687	407	5,735
1980	438	443	653	191	154	165	330	329	429	482	527	387	4,528
1981	409	438	658	537	620	609	704	718	727	703	716	458	7,297
1982	499	522	650	282	169	156	174	205	277	406	474	376	4,190
1983	308	206	161	159	153	156	158	166	169	222	326	350	2,534
1984	359	185	154	171	260	336	407	477	596	609	620	390	4,564
1985	416	503	667	758	680	638	703	715	710	699	740	485	7,714
1986	516	556	736	744	173	153	261	302	340	605	614	379	5,379
1987	432	474	686	763	690	682	729	770	737	743	753	555	8,014
1988	583	634	918	910	933	885	807	850	907	1076	1102	655	10,260
1989	603	641	943	972	940	781	773	809	956	864	1008	506	9,796
1990	493	572	1022	943	924	860	808	872	933	991	1082	602	10,102
76 - 90 AVG	477	490	676	596	525	498	541	575	631	691	738	488	6,928

Old River @ Middle River (58)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	187	167	277	320	279	317	329	361	332	340	329	280	3,518
1977	322	348	362	439	432	393	410	403	431	473	512	506	5,031
1978	569	562	355	193	98	37	56	79	186	256	278	189	2,858
1979	228	256	301	141	90	77	147	191	251	291	309	221	2,503
1980	250	241	285	39	32	31	110	111	166	195	219	187	1,866
1981	215	233	286	220	264	258	310	322	330	319	323	266	3,346
1982	304	311	285	85	31	33	31	44	84	154	190	135	1,687
1983	99	45	31	35	32	33	30	31	32	54	110	122	654
1984	126	34	32	31	73	113	151	191	258	266	270	198	1,743
1985	231	305	293	340	296	274	309	320	321	316	336	284	3,625
1986	323	328	332	331	42	32	74	96	118	263	266	188	2,393
1987	236	266	302	345	301	297	324	350	336	341	344	317	3,759
1988	402	407	435	428	431	405	364	392	430	540	542	388	5,164
1989	438	417	440	452	434	355	347	372	459	411	489	294	4,908
1990	297	352	483	451	426	391	365	402	445	491	536	363	5,002
76 - 90 AVG	282	285	300	257	217	203	224	244	279	314	337	263	3,204

Old River @ Middle River (58)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3967	3833	3733	4320	5777	4707	4372	3357	4170	3729	3593	4297	49,855
1977	4495	4807	3840	4301	5784	4719	4407	3311	4254	3961	3881	4761	52,501
1978	5277	5574	3838	4251	5777	4639	4311	3136	4089	3596	3561	4232	52,281
1979	4606	4219	3777	4258	5791	4636	4325	3189	4121	3643	3640	4016	50,221
1980	4077	3888	3744	4208	5794	4623	4318	3153	4076	3535	3514	4253	49,183
1981	4343	4254	3740	4250	5801	4690	4357	3290	4175	3679	3602	4277	50,458
1982	4490	4340	3769	4229	5792	4632	4307	3124	4028	3503	3495	4201	49,910
1983	3721	2929	3700	4226	5794	4620	4306	3118	4011	3437	3451	4213	47,526
1984	3729	2929	3704	4214	5801	4639	4330	3204	4122	3815	3555	4031	47,873
1985	3935	4432	3798	4517	5800	4708	4362	3295	4157	3673	3612	4359	50,648
1986	4659	4610	3858	4375	5774	4618	4313	3144	4048	3597	3551	4029	50,576
1987	4230	4283	3768	4536	5810	4744	4380	3333	4180	3718	3632	4589	51,203
1988	5081	5043	3891	5015	5801	4726	4370	3342	4251	4390	3971	4695	54,576
1989	5028	4882	3806	4397	5788	5032	4399	3363	4324	3882	3919	4182	53,002
1990	4318	4634	3841	4789	5781	4728	4388	3267	4279	4254	4140	4638	53,057
76 - 90 AVG	4,397	4,310	3,787	4,392	5,791	4,697	4,350	3,242	4,152	3,747	3,673	4,318	50,858

Old River @ Middle River (58)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	383	372	642	724	648	720	740	790	730	742	729	478	7,698
1977	529	573	794	948	934	884	890	871	909	977	1054	905	10,248
1978	758	774	779	486	308	192	229	271	464	592	635	392	5,880
1979	435	470	681	387	293	268	399	477	583	656	687	407	5,743
1980	445	453	654	191	154	165	330	329	429	482	527	385	4,544
1981	415	452	658	537	620	609	704	718	727	703	716	450	7,309
1982	492	522	650	282	169	156	174	205	277	406	474	376	4,183
1983	308	206	161	159	153	156	158	166	169	222	326	350	2,534
1984	359	185	154	171	260	336	407	477	596	609	620	389	4,563
1985	424	517	667	756	680	638	703	715	710	699	740	494	7,743
1986	524	562	736	744	173	153	261	302	340	605	614	379	5,393
1987	432	474	686	763	690	682	729	770	737	743	753	562	8,021
1988	571	643	924	910	933	885	807	850	907	1120	1109	674	10,333
1989	633	668	943	972	940	782	773	809	953	860	980	477	9,790
1990	492	578	1022	941	924	860	808	872	933	1026	1067	636	10,179
76 - 90 AVG	480	497	677	598	525	498	541	575	631	696	737	490	6,944

Old River @ Middle River (58)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	187	167	277	320	279	317	329	361	332	340	329	279	3,517
1977	329	345	362	439	433	393	410	403	431	473	512	507	5,037
1978	575	593	355	193	98	37	56	79	186	256	278	190	2,896
1979	231	256	300	141	90	77	147	191	251	291	309	221	2,505
1980	254	250	285	39	32	31	110	111	188	195	219	185	1,877
1981	219	249	286	220	264	258	310	322	330	319	323	262	3,362
1982	299	314	285	85	31	33	31	44	84	154	190	135	1,685
1983	99	45	31	35	32	33	30	31	32	54	110	122	654
1984	126	34	32	31	73	113	151	191	258	266	270	198	1,743
1985	236	317	294	338	296	274	309	320	321	316	336	290	3,647
1986	331	331	332	331	42	32	74	96	118	263	266	188	2,404
1987	236	265	302	345	301	297	324	350	336	341	344	318	3,759
1988	403	431	435	427	431	405	364	392	431	559	545	405	5,228
1989	480	447	440	452	434	354	347	372	459	409	477	271	4,942
1990	294	358	483	450	427	391	365	402	445	506	539	387	5,047
76 - 90 AVG	287	293	300	256	218	203	224	244	279	316	336	264	3,220

Old River @ Middle River (58)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3968	3831	3733	4311	5778	4708	4374	3357	4171	3726	3593	4278	49,826
1977	4589	4964	3845	4323	5786	4720	4407	3311	4254	3962	3861	4763	52,785
1978	5231	5645	3846	4251	5777	4639	4311	3136	4089	3596	3561	4232	52,314
1979	4678	4267	3766	4259	5791	4636	4325	3190	4121	3645	3641	4020	50,339
1980	4153	3924	3744	4208	5794	4623	4318	3153	4076	3536	3514	4240	49,283
1981	4425	4240	3739	4249	5802	4689	4357	3291	4175	3681	3601	4237	50,486
1982	4425	4323	3769	4229	5792	4632	4307	3124	4028	3503	3495	4201	49,828
1983	3721	2929	3699	4226	5794	4620	4306	3118	4011	3437	3451	4213	47,525
1984	3729	2929	3704	4214	5801	4639	4330	3204	4122	3615	3555	4030	47,872
1985	4049	4486	3798	4530	5801	4709	4363	3299	4157	3673	3612	4398	50,875
1986	4739	4678	3860	4378	5774	4618	4313	3144	4048	3597	3551	4028	50,728
1987	4232	4287	3768	4523	5810	4744	4380	3334	4180	3719	3832	4655	51,264
1988	4915	5254	3896	5011	5801	4726	4369	3342	4252	4254	3962	4731	54,513
1989	4931	4931	3806	4395	5786	5027	4398	3363	4337	3913	4010	4157	53,054
1990	4375	4774	3848	4790	5787	4728	4388	3266	4276	4177	4146	4701	53,256
76 - 90 AVG	4,411	4,364	3,788	4,393	5,791	4,697	4,350	3,242	4,153	3,736	3,679	4,326	50,930

Old River @ Middle River (58)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	387	373	642	724	648	720	740	790	730	742	729	482	7,707
1977	532	583	794	948	933	864	890	871	909	977	1054	940	10,295
1978	770	782	780	486	308	192	229	271	464	592	635	392	5,901
1979	433	469	681	387	293	268	399	477	583	656	687	406	5,739
1980	447	457	654	191	154	165	330	329	429	482	527	385	4,550
1981	414	452	658	537	620	609	704	718	727	703	716	448	7,306
1982	492	521	650	282	169	156	174	205	277	406	474	376	4,182
1983	308	206	161	159	153	156	158	166	169	222	326	350	2,534
1984	359	185	154	171	260	336	407	477	596	609	620	389	4,563
1985	422	514	667	756	680	638	703	715	710	699	740	483	7,727
1986	516	537	735	744	173	153	261	302	340	605	614	379	5,359
1987	433	475	686	763	690	682	729	770	737	743	753	550	8,011
1988	576	617	913	910	933	885	807	850	907	1095	1101	649	10,243
1989	612	646	943	972	940	781	773	810	957	868	1017	507	9,826
1990	494	574	1022	941	924	860	808	872	933	1004	1064	565	10,061
76 - 90 AVG	480	493	676	598	525	498	541	575	631	694	737	487	6,934

Old River @ Middle River (58)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	192	168	277	320	279	317	329	361	332	340	329	284	3,528
1977	337	357	362	439	432	393	410	403	431	473	512	516	5,065
1978	580	607	356	193	98	37	56	79	186	256	278	190	2,916
1979	230	256	300	141	90	77	147	191	251	291	309	220	2,503
1980	255	253	285	39	32	31	110	111	166	195	219	185	1,881
1981	219	250	286	220	264	258	310	322	330	319	323	254	3,355
1982	296	311	285	85	31	33	31	44	84	154	190	135	1,679
1983	99	45	31	35	32	33	30	31	32	54	110	122	654
1984	126	34	32	31	73	113	151	191	258	286	270	198	1,743
1985	234	314	294	338	296	274	309	320	321	316	336	279	3,631
1986	321	308	331	331	42	32	74	96	118	263	266	188	2,370
1987	237	266	302	345	301	297	324	350	336	341	344	312	3,755
1988	399	388	431	428	431	405	384	392	431	548	541	390	5,148
1989	452	422	440	452	434	355	347	372	460	412	493	290	4,929
1990	295	353	483	450	426	391	365	402	445	497	529	337	4,973
76 - 90 AVG	285	289	300	256	217	203	224	244	279	315	337	260	3,209

Old River @ Middle River (58)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3973	3834	3733	4318	5776	4707	4376	3358	4170	3725	3593	4287	49,850
1977	4691	5181	3843	4323	5787	4721	4408	3312	4254	3962	3861	4650	52,993
1978	5240	5648	3844	4251	5777	4639	4311	3136	4089	3596	3561	4232	52,322
1979	4637	4242	3766	4259	5791	4636	4325	3190	4121	3641	3638	4017	50,263
1980	4171	3932	3744	4208	5794	4623	4318	3153	4076	3536	3514	4239	49,308
1981	4403	4227	3739	4249	5802	4689	4357	3291	4175	3682	3601	4262	50,477
1982	4485	4344	3770	4229	5792	4632	4307	3124	4028	3503	3495	4201	49,910
1983	3721	2929	3699	4226	5794	4620	4306	3118	4011	3437	3451	4213	47,525
1984	3729	2929	3704	4214	5801	4639	4330	3204	4122	3615	3555	4030	47,872
1985	4025	4474	3798	4530	5801	4709	4362	3300	4157	3674	3612	4353	50,795
1986	4662	4538	3858	4379	5774	4618	4313	3144	4048	3597	3551	4029	50,511
1987	4231	4283	3768	4523	5810	4743	4379	3335	4180	3721	3632	4586	51,191
1988	5050	5040	3893	5013	5801	4730	4369	3345	4251	4343	3985	4693	54,513
1989	4999	4887	3805	4393	5788	5031	4399	3364	4316	3838	3887	4224	52,931
1990	4353	4693	3845	4787	5781	4728	4389	3267	4276	4242	4197	4601	53,159
76 - 90 AVG	4,425	4,345	3,787	4,393	5,791	4,698	4,350	3,243	4,152	3,741	3,676	4,308	50,908

Old River @ Middle River (58)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	396	379	642	721	648	720	740	790	730	742	729	529	7,766
1977	567	595	794	948	933	864	890	871	909	977	1054	906	10,308
1978	756	770	779	486	308	192	229	271	464	592	635	394	5,876
1979	435	477	682	388	293	268	399	477	583	656	692	424	5,774
1980	456	464	654	191	154	165	330	329	429	482	527	386	4,567
1981	421	451	658	537	620	609	704	718	727	703	716	465	7,329
1982	503	524	650	282	169	156	174	205	277	406	474	376	4,196
1983	308	206	161	159	153	156	158	166	169	222	326	350	2,534
1984	359	185	154	171	260	336	407	477	596	609	620	389	4,563
1985	433	534	668	756	680	638	703	715	710	699	740	498	7,774
1986	535	578	736	744	173	153	261	302	340	605	614	379	5,420
1987	432	475	686	763	690	682	729	770	737	743	753	639	8,099
1988	598	657	928	910	933	885	807	850	907	1130	1115	710	10,430
1989	644	652	943	972	940	782	773	809	959	868	1019	511	9,872
1990	494	574	1022	942	924	860	808	872	933	1032	1098	628	10,187
76 - 90 AVG	489	501	677	598	525	498	541	575	631	698	741	506	6,980

Old River @ Middle River (58)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	203	176	277	318	279	317	329	362	332	340	329	323	3,585
1977	376	367	362	439	431	393	410	403	431	473	512	506	5,103
1978	569	581	355	193	98	37	56	79	186	256	278	190	2,878
1979	232	260	301	141	90	77	147	191	251	291	310	225	2,516
1980	257	260	285	39	32	31	110	111	166	195	219	186	1,891
1981	221	239	286	220	264	258	310	322	330	319	323	269	3,361
1982	308	313	285	85	31	33	31	44	84	154	190	135	1,693
1983	99	45	31	35	32	33	30	31	32	54	110	122	654
1984	126	34	32	31	73	113	151	191	258	266	270	198	1,743
1985	241	332	294	338	296	274	309	320	321	316	336	290	3,667
1986	347	341	331	331	42	32	74	96	118	263	266	188	2,429
1987	236	266	302	345	301	297	323	350	336	341	344	344	3,785
1988	420	494	439	426	431	405	364	392	431	562	547	419	5,330
1989	481	426	440	452	434	354	347	372	461	412	494	294	4,967
1990	297	353	483	450	426	391	365	402	445	509	544	388	5,053
76 - 90 AVG	294	299	300	256	217	203	224	244	279	317	338	272	3,244

Old River @ Middle River (58)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3962	3845	3733	4311	5777	4707	4376	3358	4173	3727	3593	4423	50,005
1977	4801	5204	3849	4311	5782	4720	4406	3312	4254	3962	3861	4756	53,218
1978	5245	5624	3841	4251	5777	4839	4311	3136	4089	3596	3560	4256	52,325
1979	4679	4355	3777	4258	5791	4836	4325	3190	4121	3641	3601	4161	50,535
1980	4274	3934	3745	4208	5794	4623	4318	3153	4076	3536	3514	4259	49,434
1981	4526	4402	3740	4250	5802	4689	4357	3292	4176	3684	3602	4344	50,864
1982	4498	4351	3770	4229	5792	4632	4307	3124	4028	3503	3495	4201	49,930
1983	3721	2929	3699	4226	5794	4620	4306	3118	4011	3437	3451	4213	47,525
1984	3729	2929	3704	4214	5801	4639	4330	3204	4122	3615	3555	4031	47,873
1985	4157	4544	3798	4530	5801	4709	4363	3303	4158	3674	3611	4425	51,073
1986	4876	4849	3880	4376	5774	4618	4313	3144	4048	3597	3551	4029	51,035
1987	4231	4281	3768	4520	5810	4743	4377	3335	4181	3722	3633	4736	51,337
1988	5104	5373	3910	5009	5802	4732	4370	3344	4252	4210	3933	4825	54,864
1989	5088	4922	3806	4386	5787	5028	4398	3368	4302	3837	3879	4221	53,022
1990	4338	4680	3845	4782	5782	4729	4388	3269	4276	4150	4114	4673	53,026
76 - 90 AVG	4,483	4,415	3,790	4,391	5,791	4,698	4,350	3,243	4,151	3,726	3,664	4,370	51,071

Old River @ Middle River, 58
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	401	410	730	780	730	759	621	613	733	856	968	488
1977	527	573	763	927	960	955	773	759	909	1088	1186	962
1978	742	740	812	501	313	195	214	247	436	586	657	398
1979	449	484	737	395	255	278	347	387	629	665	684	422
1980	446	457	713	218	155	169	312	300	377	621	651	405
1981	431	479	738	615	541	619	492	484	691	709	717	446
1982	488	517	719	287	199	156	172	210	282	573	596	445
1983	243	213	155	159	153	155	164	168	176	247	398	354
1984	234	186	153	160	232	374	413	408	534	612	624	387
1985	419	514	704	745	673	650	592	544	691	729	905	504
1986	515	540	739	771	188	153	256	289	329	603	619	381
1987	433	493	761	800	725	711	614	607	723	921	990	684
1988	600	640	900	926	953	933	741	744	824	1070	1083	648
1989	608	608	914	975	954	812	730	769	796	992	1040	513
1990	488	539	972	947	962	925	782	815	908	1045	1090	608
Average	468	493	701	614	533	523	482	490	603	754	814	510

Old River @ Middle River, 58
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	210	205	330	360	323	338	265	265	334	405	468	283
1977	325	343	346	428	445	442	347	342	431	538	588	537
1978	547	532	374	201	101	38	48	67	171	253	291	203
1979	247	271	336	145	70	83	119	143	276	296	306	227
1980	252	255	317	51	32	31	100	95	138	272	287	203
1981	235	275	336	262	222	264	197	195	311	322	323	250
1982	290	314	325	87	41	33	31	47	86	246	257	173
1983	64	49	31	35	32	33	30	31	32	68	149	124
1984	60	34	32	31	58	133	154	154	223	268	272	196
1985	231	321	314	333	292	280	250	228	310	332	428	287
1986	316	313	330	352	44	32	71	89	113	262	269	193
1987	241	288	355	382	319	312	262	261	328	441	476	382
1988	421	418	424	451	442	430	330	335	384	527	529	391
1989	438	376	424	454	441	376	324	349	369	482	506	295
1990	289	321	457	451	447	426	351	371	431	513	537	370
Average	278	288	315	268	221	217	192	198	262	348	379	274

Old River @ Middle River, 58
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3923	3759	3760	4558	5781	4717	4358	3269	4176	3829	3906	4332
1977	4768	5245	3848	4303	5759	4740	4383	3267	4261	4140	4013	4791
1978	5213	5494	3868	4254	5775	4639	4310	3132	4080	3590	3591	4105
1979	4470	4249	3792	4260	5789	4635	4322	3168	4143	3850	3587	4146
1980	4149	3974	3749	4213	5793	4624	4317	3147	4060	3610	3567	4210
1981	4364	4244	3773	4258	5793	4684	4339	3204	4166	3684	3603	4282
1982	4372	4312	3857	4233	5794	4633	4307	3124	4030	3585	3542	4204
1983	3721	2929	3699	4225	5794	4619	4306	3118	4012	3445	3471	4212
1984	3720	2923	3703	4214	5799	4639	4332	3179	4102	3615	3558	4012
1985	3997	4519	3804	4491	5800	4710	4351	3230	4167	3701	3721	4386
1986	4652	4546	3790	4617	5787	4620	4313	3141	4045	3593	3553	4020
1987	4205	4279	3805	4572	5814	4752	4363	3256	4177	3904	3801	4835
1988	5132	5264	3868	5020	5802	4743	4361	3288	4215	4095	3900	4770
1989	5046	4906	3803	4412	5789	5250	4393	3344	4215	3987	3892	4224
1990	4180	4421	3835	4792	5800	4742	4381	3251	4267	4063	4035	4651
Average	4394	4338	3797	4428	5791	4716	4342	3208	4141	3766	3716	4345

Old River @ Tracy Road (71)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	356	350	658	760	686	811	720	750	764	830	1046	770	8,501
1977	487	548	788	970	944	950	768	862	872	1000	1157	956	10,302
1978	693	729	844	563	346	217	232	278	478	599	636	482	6,097
1979	365	411	767	453	319	283	396	480	591	661	690	509	5,925
1980	413	465	743	214	178	172	335	334	436	482	560	444	4,776
1981	377	404	667	587	657	638	607	708	781	857	858	630	7,771
1982	446	533	634	332	174	170	176	208	289	396	493	381	4,232
1983	307	229	171	230	176	197	162	167	174	221	340	357	2,731
1984	371	194	174	178	269	350	456	610	603	622	689	502	5,018
1985	391	498	754	835	733	696	595	696	759	851	948	699	8,455
1986	459	530	780	723	208	168	263	308	358	595	629	477	5,498
1987	407	476	703	813	742	766	716	740	737	825	1028	764	8,717
1988	491	518	948	971	950	921	722	800	858	1039	1145	866	10,229
1989	604	634	939	997	976	830	685	802	820	900	1030	746	9,963
1990	455	516	989	988	977	900	782	838	858	1023	1093	821	10,240
76 - 90 AVG	441	469	704	641	556	538	508	572	625	727	823	627	7,230

Old River @ Tracy Road (71)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	182	162	288	339	299	364	319	343	356	396	526	432	4,006
1977	340	376	370	452	436	439	345	400	417	507	586	578	5,246
1978	592	601	407	236	118	50	58	84	196	264	282	229	3,117
1979	184	228	352	176	104	85	146	194	259	299	312	259	2,598
1980	254	286	340	55	44	33	113	115	173	198	240	208	2,059
1981	198	224	294	247	284	273	258	319	365	419	418	347	3,646
1982	307	347	283	113	36	39	32	46	91	152	203	139	1,788
1983	99	62	37	73	43	53	32	32	34	55	119	127	766
1984	134	40	46	35	78	121	178	266	265	277	312	245	1,997
1985	227	316	349	381	324	304	252	312	352	415	473	387	4,092
1986	319	353	361	321	59	39	75	100	129	263	278	228	2,525
1987	239	313	319	369	329	341	317	337	340	394	518	440	4,256
1988	367	358	455	457	440	423	320	368	409	522	585	532	5,236
1989	504	483	448	467	453	375	300	371	387	444	523	412	5,167
1990	306	356	478	464	454	412	352	385	409	515	565	503	5,199
76 - 90 AVG	283	300	322	279	233	223	206	245	279	341	396	338	3,447

Old River @ Tracy Road (71)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3672	3496	3743	4292	5686	4764	4395	3467	4268	3995	4386	4354	50,518
1977	3867	3904	3840	4275	5653	4798	4412	3464	4321	4653	4357	4559	52,103
1978	4528	4388	3902	4233	5696	4652	4316	3169	4141	3726	3642	3891	50,284
1979	3958	3697	3814	4236	5720	4652	4335	3255	4182	3774	3682	3767	49,072
1980	3766	3598	3802	4208	5737	4634	4326	3197	4117	3618	3594	3851	48,448
1981	3993	3737	3749	4233	5701	4738	4370	3412	4271	4257	4174	4007	50,642
1982	3678	3902	3781	4218	5764	4636	4311	3145	4056	3574	3561	4203	48,829
1983	3746	3010	3707	4211	5748	4604	4307	3132	4019	3471	3498	4218	47,669
1984	3759	2959	3724	4208	5758	4657	4345	3343	4175	3745	3686	3776	48,135
1985	3727	3873	3932	4430	5720	4760	4367	3398	4246	4240	4366	4233	51,292
1986	3739	3859	3909	4382	5709	4617	4319	3187	4088	3720	3639	3814	48,982
1987	3773	3571	3760	4508	5737	4828	4408	3437	4249	4014	4420	4371	51,076
1988	3792	3737	3881	4828	5733	4787	4379	3438	4315	4460	4534	4446	52,330
1989	4042	4095	3797	4320	5643	5174	4438	3481	4296	4351	4555	4320	52,512
1990	3731	3641	3777	4620	5694	4784	4403	3369	4316	4509	4765	4541	52,150
76 - 90 AVG	3,851	3,698	3,808	4,347	5,713	4,739	4,362	3,326	4,204	4,007	4,057	4,157	50,269

Old River @ Tracy Road (71)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	365	376	527	700	704	704	733	763	766	733	736	609	8,501
1,977	496	609	705	873	951	913	878	878	875	914	991	880	10,302
1,978	725	765	806	674	417	266	208	254	371	528	614	491	6,097
1,979	414	453	578	576	354	287	335	444	533	620	671	516	5,925
1,980	416	456	648	445	184	155	249	335	384	459	506	434	4,776
1,981	402	435	565	627	583	625	659	714	724	717	708	566	7,771
1,982	474	548	695	507	225	176	164	192	246	346	441	427	4,232
1,983	344	274	191	223	141	144	124	164	170	198	276	340	2,731
1,984	356	278	188	168	225	307	377	447	539	606	615	472	5,018
1,985	382	492	648	730	738	670	675	711	714	706	716	609	8,455
1,986	496	553	751	770	476	144	192	287	328	467	611	460	5,498
1,987	390	478	594	738	748	706	709	748	756	737	746	607	8,717
1,988	574	622	883	942	969	935	854	821	865	948	1127	836	10,229
1,989	646	680	918	968	967	883	779	817	903	904	871	700	9,963
1,990	476	513	931	996	951	905	840	829	888	938	1015	809	10,240
76 - 90 AVG	464	502	642	662	576	521	518	560	604	655	710	584	7,230

Old River @ Tracy Road (71)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	188	177	218	307	305	303	326	351	356	341	337	326	4,006
1,977	349	418	326	400	440	419	403	409	421	451	488	531	5,246
1,978	604	632	383	295	156	76	46	71	139	227	270	236	3,117
1,979	229	274	250	242	123	87	113	175	228	277	306	269	2,598
1,980	260	276	287	173	44	33	72	115	145	186	210	205	2,059
1,981	225	265	241	268	244	267	286	323	333	330	323	315	3,646
1,982	334	361	315	206	57	39	32	39	69	125	176	164	1,788
1,983	119	86	43	72	43	53	31	32	34	47	85	118	766
1,984	127	84	46	35	55	96	136	177	231	268	271	231	1,997
1,985	222	310	290	326	327	290	295	321	327	324	327	336	4,092
1,986	356	372	344	348	199	39	53	89	114	195	268	219	2,525
1,987	224	306	260	329	332	308	313	342	350	343	344	354	4,256
1,988	456	470	421	442	445	424	390	380	415	475	563	504	5,236
1,989	542	540	439	451	446	404	351	379	438	440	426	376	5,167
1,990	312	358	447	469	440	415	383	380	427	467	508	469	5,199
76 - 90 AVG	303	329	287	291	244	217	215	239	268	300	327	310	3,447

Old River @ Tracy Road (71)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	3708	3516	3726	4290	5686	4752	4399	3500	4246	3877	3683	3883	50,518
1,977	3867	3921	3835	4272	5657	4777	4458	3462	4344	4315	4103	4501	52,103
1,978	4762	4676	3881	4231	5700	4652	4316	3168	4135	3724	3638	3853	50,284
1,979	3975	3854	3767	4233	5723	4650	4335	3255	4177	3764	3765	3793	49,072
1,980	3699	3581	3742	4202	5735	4633	4326	3196	4115	3621	3578	3833	48,448
1,981	3989	3731	3740	4226	5707	4726	4383	3417	4241	3821	3698	3858	50,642
1,982	3773	3936	3785	4217	5763	4636	4311	3145	4053	3581	3554	4204	48,829
1,983	3746	3007	3707	4211	5745	4604	4308	3133	4020	3473	3493	4218	47,669
1,984	3757	2959	3724	4208	5758	4656	4341	3268	4175	3729	3631	3756	48,135
1,985	3703	3864	3823	4801	5736	4748	4387	3405	4223	3816	3712	3962	51,292
1,986	3895	3992	3894	4687	5721	4618	4319	3186	4063	3717	3625	3745	48,982
1,987	3711	3558	3754	4654	5745	4779	4408	3465	4250	3883	3741	3972	51,076
1,988	4045	4067	3905	4815	5717	4778	4397	3487	4345	4533	4161	4241	52,330
1,989	4107	4132	3800	4315	5648	5112	4452	3494	4420	4144	4192	4084	52,512
1,990	3768	3666	3777	4620	5695	4779	4409	3380	4359	4420	4335	4348	52,150
76 - 90 AVG	3,900	3,764	3,791	4,385	5,716	4,727	4,370	3,331	4,212	3,895	3,795	4,017	50,269

Old River @ TR

Old River @ Tracy Road (71)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	359	353	632	733	661	727	744	789	736	742	729	619	7,824
1977	515	578	785	947	941	875	893	873	898	951	1027	890	10,173
1978	728	761	783	533	337	211	230	274	467	591	635	479	6,029
1979	393	463	675	430	312	276	401	480	584	656	690	519	5,879
1980	421	443	648	218	179	170	332	333	432	485	529	434	4,624
1981	398	426	650	563	629	619	705	721	728	705	716	566	7,426
1982	475	534	650	330	177	168	176	207	281	408	475	379	4,260
1983	312	224	169	230	178	197	160	167	171	224	329	352	2,711
1984	361	192	174	178	267	342	411	481	596	611	621	475	4,709
1985	392	486	667	771	695	649	705	718	712	701	738	599	7,833
1986	500	548	742	768	216	168	263	305	345	601	615	464	5,535
1987	394	461	677	769	709	700	734	770	739	742	752	608	8,055
1988	588	638	929	937	941	895	815	847	898	1049	1084	826	10,447
1989	599	640	924	980	951	808	780	809	936	862	984	750	10,023
1990	487	520	989	970	930	871	815	867	922	973	1060	807	10,211
76 - 90 AVG	461	484	673	624	541	512	544	576	630	687	732	584	7,049

Old River @ Tracy Road (71)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	183	164	274	325	286	320	332	364	340	345	333	331	3,597
1977	360	412	371	439	434	399	411	406	432	471	507	536	5,178
1978	611	619	370	220	114	47	57	82	189	260	282	229	3,080
1979	217	281	302	164	101	81	149	194	255	296	314	272	2,626
1980	262	266	286	54	44	33	112	114	171	200	223	205	1,970
1981	223	259	286	235	268	263	311	326	335	324	327	316	3,473
1982	329	348	291	112	36	39	32	46	87	158	193	139	1,810
1983	101	59	37	72	43	53	31	32	34	57	113	125	757
1984	129	38	46	35	77	116	154	195	262	271	274	233	1,830
1985	227	306	300	346	304	279	311	324	326	321	339	337	3,720
1986	359	370	340	347	63	39	75	99	123	265	270	221	2,571
1987	226	296	304	346	311	305	327	353	342	345	347	356	3,858
1988	465	483	447	439	435	410	370	394	431	531	540	481	5,426
1989	485	491	441	458	440	364	350	375	455	416	483	408	5,166
1990	327	363	478	454	429	397	370	401	445	488	531	473	5,156
76 - 90 AVG	300	317	305	270	226	210	226	247	282	317	338	311	3,348

Old River @ Tracy Road (71)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3706	3517	3725	4291	5686	4752	4397	3497	4240	3877	3686	3914	49,288
1977	3885	3875	3828	4262	5653	4777	4456	3459	4343	4310	4104	4498	51,450
1978	4659	4516	3873	4231	5700	4652	4316	3168	4135	3717	3638	3851	50,456
1979	3983	3808	3767	4233	5723	4650	4335	3255	4176	3765	3755	3785	49,235
1980	3701	3551	3742	4202	5735	4633	4326	3196	4115	3621	3578	3836	48,236
1981	3995	3649	3739	4226	5707	4728	4382	3417	4242	3824	3698	3862	49,469
1982	3774	3939	3784	4217	5763	4636	4311	3145	4053	3581	3554	4204	48,961
1983	3746	3007	3706	4211	5746	4604	4307	3132	4018	3473	3494	4218	47,662
1984	3757	2959	3724	4208	5758	4656	4341	3268	4176	3729	3631	3755	47,962
1985	3707	3824	3822	4387	5720	4747	4386	3408	4222	3815	3711	3919	49,668
1986	3849	3950	3889	4679	5721	4618	4319	3186	4083	3722	3626	3744	49,386
1987	3713	3560	3754	4658	5745	4779	4408	3463	4249	3881	3739	3959	49,908
1988	4024	3994	3905	4825	5716	4778	4395	3488	4338	4568	4194	4249	52,474
1989	4074	4076	3798	4315	5650	5131	4454	3497	4405	4097	4077	4064	51,638
1990	3769	3636	3775	4620	5694	4779	4409	3387	4354	4455	4304	4280	51,462
76 - 90 AVG	3,889	3,724	3,789	4,371	5,714	4,728	4,369	3,331	4,210	3,896	3,786	4,009	49,817

Old River @ Tracy Road (71)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	358	352	632	733	661	727	744	789	736	742	729	616	7,819
1977	514	570	783	947	941	875	893	873	898	951	1027	891	10,163
1978	729	766	784	533	337	211	230	274	467	591	635	479	6,036
1979	393	465	672	430	312	276	401	480	584	656	689	519	5,877
1980	421	453	649	218	179	170	332	333	432	485	529	431	4,632
1981	395	448	651	562	629	618	705	721	728	705	716	561	7,439
1982	470	530	651	330	177	168	176	207	281	408	475	379	4,252
1983	312	224	169	230	177	197	160	167	171	224	329	352	2,712
1984	361	192	174	178	267	342	411	481	596	611	621	475	4,709
1985	392	496	668	772	695	649	706	718	713	701	738	617	7,865
1986	509	554	742	768	216	168	263	305	345	601	615	464	5,550
1987	394	461	677	769	709	700	734	770	740	742	752	606	8,054
1988	570	618	931	939	941	895	816	847	896	1064	1095	824	10,436
1989	642	683	925	980	951	808	780	809	934	854	951	714	10,031
1990	472	517	988	968	930	871	815	867	921	1006	1071	846	10,272
76 - 90 AVG	462	489	673	624	541	512	544	576	629	689	731	585	7,056

Old River @ Tracy Road (71)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	182	163	274	325	286	320	332	365	341	345	333	329	3,595
1977	363	400	368	439	435	399	411	406	432	470	507	538	5,168
1978	609	636	372	220	114	47	57	82	189	260	282	230	3,097
1979	217	279	300	164	101	81	149	194	255	296	314	271	2,621
1980	263	274	287	54	44	33	112	114	171	201	223	202	1,978
1981	220	280	287	234	268	263	311	326	335	324	327	312	3,487
1982	324	344	292	112	36	39	32	46	87	156	193	139	1,802
1983	101	59	37	72	43	53	31	32	34	57	113	125	757
1984	129	39	46	35	77	116	154	195	262	271	274	233	1,831
1985	228	314	301	348	304	279	311	324	326	321	339	343	3,738
1986	366	376	340	347	63	39	75	99	123	265	270	221	2,584
1987	226	296	304	346	311	305	327	353	342	348	348	351	3,855
1988	443	459	446	440	435	410	370	394	431	537	546	496	5,407
1989	538	543	443	458	440	363	350	375	454	414	468	384	5,230
1990	310	359	477	453	429	397	370	401	445	503	537	497	5,178
76 - 90 AVG	301	321	305	270	226	210	226	247	282	318	338	311	3,355

Old River @ Tracy Road (71)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3705	3516	3726	4289	5686	4752	4398	3502	4248	3878	3683	3903	49,286
1977	3892	3931	3835	4269	5656	4777	4455	3461	4343	4313	4103	4500	51,535
1978	4757	4676	3881	4231	5700	4652	4316	3168	4135	3727	3638	3852	50,733
1979	3976	3855	3767	4234	5723	4650	4335	3255	4176	3763	3761	3791	49,286
1980	3701	3591	3743	4202	5735	4633	4326	3196	4115	3628	3578	3827	48,275
1981	3991	3712	3739	4225	5708	4726	4382	3422	4241	3821	3698	3842	49,507
1982	3741	3909	3784	4217	5763	4636	4311	3145	4053	3581	3554	4204	48,898
1983	3746	3007	3707	4211	5745	4604	4308	3134	4020	3473	3494	4218	47,667
1984	3757	2959	3723	4208	5758	4656	4341	3268	4176	3729	3631	3755	47,961
1985	3706	3876	3823	4639	5738	4749	4386	3407	4223	3818	3713	3972	50,050
1986	3904	4003	3895	4687	5721	4618	4319	3186	4083	3720	3626	3743	49,505
1987	3713	3559	3754	4659	5745	4779	4410	3472	4252	3891	3744	4017	49,995
1988	4101	4133	3913	4819	5715	4778	4399	3489	4347	4529	4175	4244	52,642
1989	4132	4161	3803	4314	5847	5108	4452	3495	4420	4143	4193	4087	51,955
1990	3776	3674	3777	4620	5698	4779	4409	3387	4361	4388	4295	4352	51,516
76 - 90 AVG	3,907	3,771	3,791	4,388	5,716	4,726	4,370	3,332	4,213	3,893	3,792	4,020	49,921

Old River @ Tracy Road (71)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	367	357	632	733	661	727	744	769	736	742	729	618	7,835
1977	515	555	782	947	941	875	893	873	898	951	1027	887	10,144
1978	729	774	764	533	338	211	230	274	467	591	635	480	6,046
1979	394	464	672	430	312	276	401	480	584	656	690	518	5,877
1980	420	457	649	218	179	170	332	333	432	485	529	430	4,634
1981	395	450	651	562	629	619	705	721	728	705	716	561	7,442
1982	462	529	650	330	177	168	176	207	281	406	475	379	4,242
1983	312	224	169	230	176	197	160	167	171	224	329	352	2,711
1984	361	192	174	178	267	342	411	481	596	611	621	475	4,709
1985	392	492	668	772	695	649	705	718	713	701	738	606	7,849
1986	498	532	741	768	216	168	263	305	345	601	615	464	5,516
1987	395	463	677	769	709	700	734	770	740	742	752	601	8,052
1988	579	602	925	937	941	896	816	846	896	1058	1085	826	10,407
1989	618	652	924	980	951	806	780	809	938	869	994	753	10,076
1990	482	517	989	967	930	871	816	867	921	986	1049	778	10,173
76 - 90 AVG	461	484	672	624	541	512	544	576	630	689	732	582	7,048

Old River @ Tracy Road (71)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	192	168	274	325	286	320	332	365	341	345	333	334	3,615
1977	366	385	366	439	434	399	411	406	432	470	507	537	5,152
1978	613	641	372	220	114	46	57	82	189	260	282	231	3,107
1979	219	281	300	164	101	81	149	194	255	296	314	270	2,624
1980	262	278	287	54	44	33	112	114	171	201	223	202	1,981
1981	221	283	288	235	268	263	311	326	336	325	327	304	3,487
1982	313	341	291	112	36	39	32	46	87	158	193	139	1,787
1983	101	59	37	72	43	53	31	32	34	57	113	125	757
1984	129	38	46	35	77	116	154	195	262	271	274	233	1,830
1985	228	311	301	348	304	279	311	325	326	322	339	333	3,727
1986	352	350	339	347	63	39	75	99	123	265	270	221	2,543
1987	228	298	304	346	311	305	327	354	342	346	347	350	3,858
1988	455	437	442	439	435	410	370	394	432	535	541	488	5,378
1989	509	506	441	458	440	364	351	375	456	420	487	405	5,212
1990	319	359	477	453	429	397	370	400	445	494	526	450	5,119
76 - 90 AVG	300	316	304	270	226	210	226	247	282	318	338	308	3,345

Old River @ Tracy Road (71)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3715	3520	3725	4290	5686	4750	4399	3505	4249	3879	3685	3907	49,310
1977	3888	3943	3847	4270	5655	4779	4458	3463	4343	4313	4103	4515	51,576
1978	4766	4682	3882	4231	5699	4652	4316	3168	4135	3727	3638	3852	50,748
1979	3980	3828	3764	4236	5723	4650	4335	3255	4176	3770	3749	3788	49,254
1980	3695	3602	3743	4202	5735	4633	4326	3196	4115	3628	3578	3826	48,279
1981	3989	3696	3738	4228	5710	4727	4382	3421	4246	3836	3698	3865	49,534
1982	3781	3941	3785	4217	5763	4636	4311	3145	4053	3580	3554	4204	48,970
1983	3746	3007	3706	4211	5746	4604	4307	3132	4018	3473	3494	4218	47,662
1984	3757	2959	3724	4208	5757	4656	4341	3268	4176	3729	3631	3755	47,961
1985	3706	3862	3823	4577	5734	4749	4386	3412	4223	3830	3710	3940	49,952
1986	3855	3918	3891	4694	5722	4618	4319	3186	4083	3723	3626	3744	49,379
1987	3713	3559	3754	4661	5745	4779	4411	3479	4254	3909	3736	3958	49,960
1988	4018	3985	3903	4823	5715	4790	4399	3502	4344	4551	4194	4247	52,471
1989	4065	4078	3797	4312	5649	5130	4454	3487	4404	4072	4038	4080	51,566
1990	3800	3657	3775	4618	5693	4779	4414	3383	4362	4444	4340	4283	51,548
76 - 90 AVG	3,898	3,749	3,790	4,385	5,715	4,729	4,371	3,333	4,212	3,898	3,785	4,012	49,878

Old River @ Tracy Road (71)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	379	373	632	734	661	727	745	789	736	742	729	653	7,900
1977	575	587	783	948	941	875	893	873	898	950	1027	889	10,239
1978	724	763	784	533	337	211	230	274	467	591	635	480	6,029
1979	394	469	676	430	312	276	401	480	584	656	692	548	5,918
1980	424	465	650	218	179	170	332	333	432	485	529	432	4,649
1981	395	434	651	563	829	619	705	722	728	705	716	578	7,445
1982	484	537	651	330	177	168	176	207	281	408	475	379	4,273
1983	312	224	169	230	176	197	160	167	171	224	329	352	2,711
1984	361	192	174	178	267	342	411	481	596	611	621	475	4,709
1985	392	510	669	772	695	649	706	718	713	701	738	614	7,877
1986	517	563	743	768	216	168	263	305	345	600	615	464	5,567
1987	395	462	677	769	709	700	734	770	740	742	752	642	8,092
1988	582	646	934	940	942	898	816	846	895	1057	1100	853	10,509
1989	647	669	924	980	951	808	780	808	933	869	996	759	10,124
1990	488	519	989	968	930	871	816	867	921	1010	1080	843	10,302
76 - 90 AVG	471	494	674	624	541	512	545	576	629	690	736	597	7,090

Old River @ Tracy Road (71)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	207	187	274	325	286	320	332	365	340	346	333	361	3,676
1977	432	419	387	439	435	399	411	406	432	470	507	535	5,252
1978	605	628	371	220	114	47	57	82	189	260	282	229	3,084
1979	219	285	303	164	101	81	149	194	255	296	314	279	2,640
1980	258	285	288	54	44	33	112	114	171	201	223	203	1,986
1981	220	258	286	235	268	263	311	327	337	325	327	320	3,477
1982	337	351	291	112	36	39	32	46	87	158	193	139	1,821
1983	101	59	37	72	43	53	31	32	34	57	113	125	757
1984	129	39	46	35	77	116	154	195	262	271	274	233	1,831
1985	229	325	302	348	304	280	311	325	327	322	339	342	3,754
1986	376	385	340	347	63	39	75	99	123	265	270	222	2,804
1987	227	297	304	346	311	306	327	354	344	347	348	357	3,868
1988	440	497	451	440	435	411	370	394	431	535	549	500	5,453
1989	536	522	440	458	440	363	351	376	455	420	487	410	5,258
1990	325	361	478	454	429	397	370	401	445	504	541	502	5,207
76 - 90 AVG	309	327	305	270	226	210	226	247	282	318	340	317	3,376

Old River @ Tracy Road (71)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3725	3537	3726	4331	5693	4753	4400	3511	4248	3894	3688	3970	49,476
1977	3981	4004	3847	4265	5649	4781	4454	3465	4343	4313	4103	4501	51,706
1978	4723	4626	3879	4231	5700	4652	4316	3168	4135	3727	3644	3870	50,671
1979	3981	3847	3772	4233	5723	4650	4335	3256	4179	3773	3695	3859	49,303
1980	3814	3643	3744	4202	5735	4633	4326	3197	4115	3629	3580	3841	48,459
1981	3992	3761	3742	4225	5707	4727	4382	3433	4259	3846	3702	3922	49,698
1982	3811	3951	3786	4218	5763	4636	4311	3145	4053	3580	3554	4204	49,012
1983	3746	3008	3707	4210	5746	4604	4307	3132	4018	3473	3494	4218	47,663
1984	3757	2959	3723	4208	5758	4656	4341	3268	4176	3729	3631	3755	47,961
1985	3698	3934	3825	4636	5738	4750	4388	3426	4233	3830	3711	3975	50,144
1986	3938	4083	3895	4683	5721	4618	4319	3186	4083	3725	3626	3745	49,622
1987	3714	3561	3754	4648	5744	4778	4414	3482	4269	3926	3759	4275	50,324
1988	4572	4560	3935	4814	5714	4807	4397	3499	4349	4567	4172	4355	53,741
1989	4247	4188	3801	4308	5644	5109	4451	3533	4407	4063	4031	4082	51,864
1990	3795	3646	3775	4610	5693	4779	4417	3403	4362	4372	4270	4314	51,436
76 - 90 AVG	3,966	3,821	3,794	4,388	5,715	4,729	4,371	3,340	4,215	3,896	3,777	4,059	50,072

Old River @ Tracy Road, 71
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	382	380	717	780	740	768	634	616	727	840	944	722
1977	487	526	750	926	984	963	791	761	893	1011	1142	932
1978	690	735	816	549	344	214	215	250	438	585	658	490
1979	408	475	726	439	274	285	351	391	625	666	685	521
1980	426	451	707	252	182	174	314	304	381	615	652	483
1981	406	469	724	639	556	624	503	489	684	710	716	564
1982	462	525	726	337	210	169	174	212	286	568	598	451
1983	248	230	162	227	177	194	166	170	179	251	398	358
1984	238	191	172	167	238	378	417	414	534	612	624	477
1985	394	488	704	764	688	660	601	552	686	728	887	690
1986	486	537	738	792	250	169	257	291	335	600	619	470
1987	398	468	754	789	743	729	826	612	718	889	975	719
1988	583	609	900	936	957	945	758	747	816	990	1068	835
1989	604	606	894	981	963	842	740	769	794	959	1026	765
1990	479	506	942	974	966	934	797	814	894	1006	1075	813
Average	446	480	695	637	550	537	490	493	599	735	804	619

Old River @ Tracy Road, 71
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	212	198	321	352	328	342	273	271	336	404	461	391
1977	329	347	347	428	447	445	357	345	428	512	576	557
1978	577	590	388	229	117	48	49	69	174	256	294	243
1979	240	295	332	169	80	86	122	146	278	301	309	270
1980	263	276	319	70	46	33	102	99	142	273	290	236
1981	233	307	328	276	230	266	203	200	312	328	327	301
1982	308	340	333	116	46	39	32	49	90	246	261	177
1983	68	63	36	71	43	52	31	32	34	71	151	127
1984	63	38	45	35	61	136	157	158	227	271	276	234
1985	228	308	322	344	300	285	255	233	312	337	424	375
1986	337	355	337	361	75	39	72	92	117	264	273	228
1987	234	309	348	358	329	321	269	267	331	434	475	414
1988	454	437	428	440	444	436	339	339	386	498	529	488
1989	481	439	422	459	446	382	330	353	373	473	505	413
1990	318	344	451	457	449	430	360	372	430	502	536	477
Average	290	310	317	278	229	223	197	202	265	345	379	329

Old River @ Tracy Road, 71
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3713	3416	3746	4690	5736	4759	4381	3373	4252	4086	4091	4087
1977	3886	3981	3841	4258	5632	4804	4416	3378	4338	4593	4304	4499
1978	4489	4386	3885	4234	5696	4652	4314	3161	4123	3691	3661	3770
1979	3783	3773	3790	4236	5730	4649	4332	3229	4201	3774	3679	3787
1980	3778	3582	3762	4207	5729	4834	4324	3188	4095	3730	3648	3791
1981	3923	3615	3771	4242	5712	4723	4355	3281	4247	3877	3707	3890
1982	3788	3901	3830	4222	5755	4638	4311	3146	4055	3688	3614	4205
1983	3740	3012	3705	4210	5746	4605	4306	3135	4022	3488	3521	4218
1984	3739	2956	3721	4207	5761	4657	4343	3245	4146	3729	3633	3760
1985	3706	3881	3849	4573	5732	4751	4370	3318	4224	3870	3863	4025
1986	3874	3929	3887	4837	5698	4623	4318	3182	4079	3694	3627	3744
1987	3695	3492	3785	4680	5757	4802	4393	3358	4261	4191	3989	4267
1988	4264	4150	3894	4852	5736	4841	4387	3412	4299	4517	4108	4309
1989	4130	4099	3804	4326	5652	5229	4452	3475	4288	4243	4059	4068
1990	3726	3527	3768	4620	5709	4792	4415	3374	4352	4389	4191	4265
Average	3883	3713	3803	4426	5719	4744	4381	3284	4199	3971	3846	4046

SJR @ Prisoners Point (40)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	178	190	172	277	423	402	329	298	266	262	336	351	3,484
1977	413	482	454	682	837	581	416	396	389	443	518	596	6,207
1978	551	493	356	267	246	236	223	217	180	179	190	209	3,347
1979	232	340	340	325	268	224	196	183	178	179	210	263	2,938
1980	321	321	235	198	179	177	199	205	181	177	184	216	2,593
1981	246	305	241	210	215	200	195	202	216	245	284	322	2,881
1982	365	386	193	226	179	185	169	192	187	171	169	167	2,589
1983	176	210	168	186	175	172	168	168	177	206	180	185	2,171
1984	176	190	169	185	209	197	181	188	189	179	189	230	2,282
1985	322	387	190	239	379	262	219	226	206	237	283	328	3,278
1986	364	359	289	343	189	166	201	212	203	196	190	233	2,945
1987	323	431	400	696	635	329	234	221	220	246	313	378	4,426
1988	340	315	280	377	264	236	295	346	281	262	406	500	3,902
1989	453	391	351	635	688	295	185	192	211	235	293	330	4,259
1990	353	441	426	910	680	335	303	286	231	252	372	469	5,058
76 - 90 AVG	321	349	284	384	371	266	234	235	221	231	274	318	3,491

SJR @ Prisoners Point (40)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	59	55	46	158	329	310	220	181	148	149	246	267	2,168
1977	312	375	366	645	830	525	321	286	286	358	454	556	5,314
1978	468	366	244	104	78	70	62	66	53	54	68	87	1,720
1979	120	241	247	186	93	69	58	56	56	54	94	161	1,435
1980	233	230	123	59	48	42	56	64	55	53	63	96	1,122
1981	135	192	129	70	62	58	56	68	96	135	184	233	1,416
1982	275	304	70	73	47	52	38	47	54	46	46	45	1,097
1983	49	67	44	53	45	44	37	36	40	56	49	53	573
1984	51	52	47	45	57	55	48	62	69	56	69	121	732
1985	236	305	67	116	275	128	83	100	85	125	183	239	1,942
1986	274	260	184	231	61	42	57	66	66	63	66	123	1,493
1987	233	342	321	669	583	210	94	84	101	136	217	299	3,289
1988	247	190	169	277	132	103	180	249	176	153	328	444	2,648
1989	365	289	257	591	639	182	59	69	95	124	194	242	3,106
1990	267	351	343	927	635	219	194	179	118	142	288	408	4,071
76 - 90 AVG	222	241	177	280	261	140	104	108	100	114	170	225	2,142

SJR @ Prisoners Point (40)
Existing Conditions
Dissolved Organic Compound
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2422	2639	2983	3649	4024	3712	3316	3345	3494	3261	2979	2765	38,589
1977	2917	3043	3179	3610	3934	3819	3503	3579	3682	3710	3642	3274	41,892
1978	3206	3208	3502	5465	5665	5109	4243	3463	2887	3149	3012	2826	45,735
1979	2645	2677	2993	4668	5912	4474	3316	2888	2862	3073	2929	2767	41,204
1980	2579	2563	3058	4240	5457	4817	3630	3164	2867	3054	2942	2652	41,023
1981	2691	2781	3009	3906	4577	4135	3394	3157	2982	2942	2897	2712	39,183
1982	2673	2741	3374	4770	5000	4525	3749	3231	2982	2964	2828	2674	41,511
1983	2644	3428	3593	4294	5548	4444	4268	3288	3898	3730	3091	2953	45,179
1984	2714	3040	3725	4271	4803	3882	2933	2856	2931	3032	2890	2739	39,816
1985	2523	2836	3290	3517	4094	4166	3477	3147	2980	2947	2914	2731	38,622
1986	2715	2803	3188	3876	5191	4368	3786	3322	3129	3388	3094	2786	41,646
1987	2617	2764	2971	3384	4081	4009	3712	3414	3028	2986	2984	2804	38,754
1988	2718	2881	3201	3643	4223	4012	3325	3032	3056	3115	3162	2933	39,301
1989	2998	2921	3107	3570	4303	3549	2756	2744	2812	2925	2952	2726	37,363
1990	2645	2827	3116	3334	4124	4121	3066	2904	2920	3029	3068	2881	38,035
76 - 90 AVG	2,714	2,877	3,219	4,013	4,729	4,196	3,498	3,169	3,101	3,154	3,026	2,828	40,524

SJR @ Prisoners Point (40)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	184	183	211	540	651	459	338	309	279	244	311	379	3,484
1,977	454	522	516	784	890	598	425	413	431	473	536	617	6,207
1,978	612	522	344	266	303	266	206	199	179	184	191	239	3,347
1,979	313	376	341	352	275	217	188	182	176	184	239	286	2,938
1,980	311	297	216	284	182	164	177	197	181	180	187	239	2,593
1,981	300	375	371	350	225	189	182	213	225	246	306	357	2,881
1,982	387	370	191	253	204	189	161	180	183	171	173	170	2,589
1,983	164	222	178	181	148	133	129	164	174	188	175	173	2,171
1,984	168	235	178	176	188	184	181	189	184	184	205	238	2,282
1,985	312	410	230	290	456	309	238	258	227	238	308	374	3,278
1,986	383	358	290	347	299	153	170	203	203	189	187	226	2,945
1,987	305	421	406	786	664	326	224	214	220	240	312	455	4,426
1,988	459	377	326	412	285	239	284	317	281	258	389	536	3,902
1,989	521	416	352	646	696	291	183	185	192	223	294	329	4,259
1,990	365	461	454	897	641	334	319	319	247	255	349	457	5,058
76 - 90 AVG	349	370	307	438	407	270	227	236	225	230	277	338	3,491

SJR @ Prisoners Point (40)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	65	54	96	477	605	378	231	197	164	130	215	300	2,168
1,977	353	423	437	767	894	545	332	312	337	392	473	575	5,314
1,978	511	383	230	103	107	86	55	58	52	56	71	119	1,720
1,979	209	279	251	223	101	67	53	56	55	62	131	189	1,435
1,980	219	200	100	103	48	42	47	60	55	54	66	123	1,122
1,981	200	278	288	249	93	54	50	89	106	135	210	274	1,416
1,982	300	285	67	87	58	52	37	42	51	46	51	47	1,097
1,983	43	74	47	52	45	44	37	36	39	51	47	46	573
1,984	46	76	48	45	48	48	48	59	62	63	89	131	732
1,985	223	331	112	179	369	181	107	146	114	127	211	294	1,942
1,986	290	254	185	236	118	43	49	63	66	59	66	116	1,493
1,987	210	328	328	779	618	206	88	81	100	127	214	387	3,289
1,988	369	258	224	319	148	102	162	208	170	146	306	486	2,648
1,989	455	326	259	606	649	177	57	59	72	109	195	241	3,106
1,990	281	376	375	912	590	219	215	221	138	146	261	392	4,071
76 - 90 AVG	252	262	203	342	299	150	105	112	106	114	174	248	2,142

SJR @ Prisoners Point (40)
No-Action Alternative
Dissolved Organic Compound
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2424	2574	2933	3546	3978	3728	3298	3283	3510	3174	2996	2797	38,589
1,977	2916	3023	3204	3616	3920	3814	3519	3530	3683	3777	3760	3418	41,892
1,978	3421	3306	3475	5468	6093	5070	4150	3380	2920	3261	2927	2841	45,735
1,979	2776	2730	2943	4472	5995	4458	3214	2890	2677	2864	2813	2676	41,204
1,980	2549	2556	3059	4231	5355	4458	3393	3106	2889	3106	2935	2851	41,023
1,981	2691	2768	2968	3477	3971	3640	3023	3007	2981	3028	2988	2757	39,183
1,982	2694	2743	3379	4739	4985	4492	3712	3216	3041	2967	2844	2681	41,511
1,983	2469	3369	3587	4268	5535	4428	4251	3278	3900	3728	3066	2831	45,179
1,984	2614	3010	3715	4244	4734	3736	2959	2972	2839	2900	2816	2694	39,816
1,985	2508	2853	3288	3431	4008	4382	3418	2933	2875	2981	3050	2825	38,622
1,986	2799	2830	3181	3845	5090	4326	3774	3337	3185	3288	2920	2706	41,646
1,987	2602	2765	2963	3321	4044	4018	3511	3272	3046	3106	3179	3025	38,754
1,988	3019	2975	3187	3636	4561	4196	3486	3218	3283	3218	3205	2996	39,301
1,989	2991	2871	3074	3549	4320	3556	2747	2814	2798	2916	2938	2736	37,363
1,990	2638	2816	3119	3329	4039	4064	3011	2813	2847	2987	3024	2910	38,035
76 - 90 AVG	2,741	2,879	3,205	3,945	4,709	4,158	3,431	3,137	3,098	3,153	3,032	2,850	40,524

SJR @ Prisoners Point (40)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	179	179	210	537	644	454	335	308	268	238	308	390	4,050
1977	465	568	542	728	837	599	423	407	420	466	535	623	6,613
1978	588	513	371	267	279	234	217	206	181	181	189	233	3,459
1979	315	377	333	345	268	215	190	182	175	182	239	288	3,109
1980	305	263	207	199	175	174	188	201	182	179	189	242	2,524
1981	294	331	326	332	220	191	184	217	225	244	306	347	3,217
1982	373	348	188	225	181	184	168	191	190	172	173	168	2,561
1983	162	200	166	186	174	172	166	167	175	203	180	174	2,125
1984	168	186	167	184	205	189	183	191	184	184	205	239	2,285
1985	312	393	224	268	427	304	232	241	212	236	312	375	3,536
1986	385	370	288	338	187	166	204	215	207	193	188	226	2,967
1987	303	415	402	776	655	323	222	213	220	241	313	456	4,539
1988	489	426	364	419	283	239	288	325	271	242	350	481	4,177
1989	477	414	355	645	709	302	185	185	192	228	318	357	4,367
1990	362	453	450	875	605	320	300	292	239	250	343	454	4,943
76 - 90 AVG	345	364	306	422	390	271	232	236	223	229	277	337	3,631

SJR @ Prisoners Point (40)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	60	52	94	474	597	372	229	198	155	125	212	313	2,881
1977	384	492	471	696	828	546	330	307	327	386	472	581	5,820
1978	500	392	265	106	94	68	61	62	53	54	69	115	1,839
1979	214	283	242	215	97	65	55	56	54	60	131	191	1,863
1980	214	185	90	57	46	42	52	62	55	54	69	128	1,054
1981	196	223	232	228	87	54	51	94	109	132	208	262	1,876
1982	284	258	63	73	48	52	37	46	55	46	50	46	1,058
1983	42	62	43	53	45	44	37	36	39	57	49	47	554
1984	47	50	46	45	56	51	49	60	63	63	89	132	751
1985	224	312	105	151	333	177	101	124	95	123	216	295	2,256
1986	295	271	182	225	60	42	58	67	68	61	67	116	1,512
1987	209	323	324	768	608	203	86	81	101	128	216	389	3,436
1988	413	328	273	328	145	100	169	219	163	130	260	421	2,949
1989	405	326	264	604	687	191	59	59	71	114	223	274	3,257
1990	279	372	373	886	546	202	191	188	128	142	253	390	3,950
76 - 90 AVG	251	262	204	327	284	147	104	111	102	112	172	247	2,324

SJR @ Prisoners Point (40)
State Permit
Dissolved Organic Compound
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2421	2573	2932	3542	3975	3729	3244	3223	3371	3084	3002	2813	37,909
1977	2852	2954	3179	3731	4011	3825	3474	3460	3635	3746	3745	3413	42,025
1978	3305	3211	3465	5445	6087	5071	4150	3379	2922	3176	2901	2839	45,951
1979	2734	2713	2955	4485	5989	4455	3215	2871	2675	2890	2822	2676	40,480
1980	2515	2545	3055	4227	5355	4470	3414	3112	2889	3081	2932	2854	40,449
1981	2616	2755	2972	3472	3966	3795	3061	3005	3005	3097	3044	2768	37,556
1982	2703	2738	3376	4739	4989	4506	3716	3215	3037	2968	2843	2677	41,507
1983	2468	3369	3587	4289	5539	4428	4251	3278	3899	3728	3066	2830	44,752
1984	2613	3010	3715	4244	4734	3742	2963	2974	2840	2900	2816	2694	39,245
1985	2469	2839	3286	3484	4043	4268	3374	2997	2901	2993	3065	2811	38,530
1986	2779	2821	3176	3847	5091	4326	3833	3353	3183	3354	2942	2707	41,412
1987	2602	2763	2962	3322	4044	4018	3480	3239	3024	3087	3155	3013	38,709
1988	2954	2922	3166	3626	4583	4207	3417	3170	3084	3043	3151	2974	40,297
1989	2939	2852	3072	3548	4217	3518	2747	2824	2824	2939	3009	2756	37,243
1990	2618	2776	3110	3329	4078	4086	3054	2877	2822	2936	3033	2892	37,611
76 - 90 AVG	2,706	2,856	3,201	3,955	4,713	4,163	3,426	3,132	3,074	3,135	3,036	2,848	40,245

SJR @ Prisoners Point (40)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	178	179	207	515	639	457	335	302	273	243	313	389	4,030
1977	447	516	518	779	878	592	420	410	428	475	540	623	6,626
1978	611	514	344	266	279	234	217	206	181	189	192	234	3,467
1979	314	372	342	361	271	215	189	183	176	184	241	286	3,134
1980	311	301	217	200	175	174	187	201	182	190	190	235	2,563
1981	314	415	398	426	253	194	183	211	220	244	304	344	3,506
1982	367	363	191	225	181	184	168	191	190	174	176	171	2,581
1983	163	200	165	184	174	172	166	167	175	203	180	174	2,123
1984	168	186	167	184	205	189	183	191	184	184	205	238	2,284
1985	314	432	201	278	457	308	238	252	221	241	322	381	3,645
1986	389	366	293	328	185	166	201	214	207	190	188	226	2,953
1987	302	414	402	777	656	323	230	221	218	236	306	439	4,524
1988	437	354	300	389	277	238	279	304	276	258	386	533	4,031
1989	521	422	354	641	688	289	183	184	192	224	295	330	4,323
1990	363	456	445	888	640	335	317	312	240	254	377	496	5,123
76 - 90 AVG	347	366	303	429	397	271	233	237	224	233	281	340	3,661

SJR @ Prisoners Point (40)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	59	52	91	447	590	375	228	188	155	128	217	312	2,842
1977	354	420	439	760	880	538	327	311	336	396	478	582	5,821
1978	512	379	231	104	94	69	61	62	53	60	72	116	1,813
1979	209	275	254	235	100	65	54	57	55	63	132	189	1,688
1980	219	205	102	58	46	42	51	62	56	60	68	119	1,088
1981	218	328	320	342	127	60	51	85	102	132	207	258	2,230
1982	278	277	66	73	48	52	37	46	55	48	54	48	1,082
1983	42	63	43	52	45	44	37	36	39	57	49	47	554
1984	47	50	46	45	56	51	49	59	63	63	89	131	749
1985	225	359	79	165	371	180	106	138	107	130	227	301	2,388
1986	296	264	188	214	58	42	57	67	68	59	67	116	1,496
1987	207	321	324	768	608	203	90	82	95	121	206	367	3,392
1988	332	219	192	292	138	98	152	189	161	144	301	483	2,701
1989	453	331	262	600	639	174	57	59	71	110	197	241	3,194
1990	280	368	386	901	590	221	212	211	129	144	294	439	4,155
76 - 90 AVG	249	261	200	337	293	148	105	110	103	114	177	250	2,346

SJR @ Prisoners Point (40)
Percent Inflow
Dissolved Organic Compound
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2422	2573	2939	3575	3997	3730	3298	3304	3553	3183	3007	2810	38,391
1977	2921	3025	3208	3628	3928	3815	3453	3462	3659	3768	3756	3417	42,040
1978	3422	3306	3475	5468	6092	5073	4150	3383	2925	3322	2944	2842	46,402
1979	2777	2730	2937	4494	6020	4454	3204	2889	2678	2864	2812	2676	40,535
1980	2553	2559	3060	4233	5355	4458	3394	3107	2889	3262	2966	2847	40,683
1981	2671	2751	2964	3404	3940	3692	3046	3052	3003	3031	2987	2745	37,286
1982	2672	2736	3379	4740	4985	4493	3713	3216	3051	3004	2863	2687	41,539
1983	2472	3372	3585	4268	5535	4428	4252	3278	3899	3728	3086	2830	44,733
1984	2613	3010	3715	4245	4734	3742	2962	2972	2839	2900	2816	2694	39,242
1985	2516	2863	3317	3427	4009	4396	3423	2950	2884	3004	3080	2832	38,701
1986	2813	2844	3183	3816	5086	4326	3774	3338	3190	3306	2926	2706	41,308
1987	2602	2764	2963	3322	4045	4021	3676	3450	3155	3190	3271	3062	39,521
1988	3083	3039	3201	3635	4595	4223	3579	3304	3338	3257	3237	3009	41,500
1989	3012	2895	3081	3553	4331	3559	2747	2814	2799	2916	2938	2737	37,382
1990	2642	2824	3124	3332	4022	4052	3010	2849	2905	3024	3074	2930	37,788
76 - 90 AVG	2,746	2,886	3,209	3,943	4,712	4,164	3,445	3,158	3,118	3,184	3,051	2,855	40,470

SJR @ Prisoners Point (40)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	187	180	210	534	644	454	335	304	279	245	323	392	4,087
1977	416	445	391	596	803	573	416	404	421	468	535	628	6,098
1978	612	530	363	269	276	233	217	206	181	189	193	236	3,505
1979	316	375	343	361	271	213	189	183	176	182	236	284	3,129
1980	316	305	218	200	175	174	187	201	182	187	188	235	2,568
1981	317	420	399	434	259	195	183	211	223	237	286	326	3,490
1982	365	351	189	225	181	184	168	191	190	174	175	171	2,564
1983	163	200	165	187	174	172	166	167	175	203	180	174	2,126
1984	168	186	167	184	205	188	183	191	184	185	205	238	2,284
1985	310	428	201	275	453	308	238	242	212	231	303	366	3,567
1986	363	323	274	350	188	166	202	214	207	194	188	227	2,896
1987	306	416	402	776	656	323	234	229	219	234	302	445	4,542
1988	432	356	344	420	286	240	262	291	261	244	365	505	4,006
1989	486	406	352	640	707	303	185	186	199	226	301	343	4,334
1990	359	452	443	870	616	324	274	255	232	240	319	413	4,797
76 - 90 AVG	341	358	297	421	393	270	229	232	223	229	273	332	3,599

SJR @ Prisoners Point (40)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	70	53	95	471	596	373	226	188	159	130	229	316	2,906
1977	304	318	291	542	789	515	320	301	325	386	472	586	5,149
1978	517	395	252	106	93	68	61	62	53	60	72	119	1,858
1979	213	279	255	235	100	65	54	56	55	60	127	186	1,685
1980	225	211	102	58	46	42	51	62	56	59	67	120	1,099
1981	223	334	322	351	134	61	51	85	103	121	184	236	2,205
1982	274	261	64	73	48	52	37	46	55	48	53	48	1,059
1983	42	63	43	54	45	44	37	36	39	57	49	47	556
1984	47	50	46	45	56	51	49	59	63	63	89	131	749
1985	222	354	80	161	365	180	106	126	94	116	203	283	2,290
1986	269	217	166	239	61	42	58	67	68	61	66	117	1,431
1987	212	324	324	768	609	202	92	86	93	116	201	375	3,402
1988	340	241	248	329	149	95	124	165	142	130	278	450	2,691
1989	416	315	260	599	665	192	59	62	80	111	202	256	3,217
1990	275	368	364	880	560	206	156	141	119	129	225	340	3,763
76 - 90 AVG	243	252	194	327	288	146	99	103	100	110	168	241	2,271

SJR @ Prisoners Point (40)
Flow Study
Dissolved Organic Compound
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2426	2574	2933	3547	3979	3725	3334	3355	3616	3213	3033	2811	38,546
1977	3004	3126	3168	3590	3928	3815	3536	3565	3700	3781	3761	3464	42,438
1978	3418	3325	3495	5486	6071	5069	4150	3383	2928	3325	2944	2841	46,435
1979	2750	2720	2938	4494	6025	4434	3185	2885	2678	2907	2827	2676	40,517
1980	2563	2561	3060	4231	5355	4458	3392	3104	2888	3217	2950	2844	40,623
1981	2657	2744	2961	3405	3945	3685	3040	3046	3181	3216	3054	2765	37,699
1982	2698	2740	3377	4739	4986	4493	3714	3216	3051	3017	2866	2687	41,584
1983	2479	3375	3585	4308	5538	4428	4251	3278	3899	3728	3086	2831	44,786
1984	2615	3010	3715	4244	4736	3736	2959	2972	2839	2900	2816	2694	39,236
1985	2505	2860	3319	3442	4019	4408	3430	3001	2933	3118	3089	2820	38,944
1986	2756	2788	3172	3861	5090	4326	3799	3345	3186	3362	2945	2708	41,338
1987	2602	2763	2962	3322	4043	4020	3775	3592	3240	3303	3239	3015	39,876
1988	2954	2912	3163	3630	4601	4484	3795	3468	3339	3147	3164	2969	41,626
1989	2940	2856	3075	3552	4218	3520	2747	2783	2640	3086	3093	2776	37,486
1990	2632	2797	3105	3326	4074	4088	3199	2941	2932	2980	3010	2861	37,945
76 - 90 AVG	2,733	2,877	3,202	3,945	4,707	4,179	3,487	3,196	3,150	3,220	3,058	2,851	40,605

SJR @ Prisoners Point (40)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	219	201	230	653	692	452	340	303	269	257	387	468	4,471
1977	433	414	370	557	774	574	420	400	406	460	530	618	5,956
1978	602	516	355	269	282	234	217	207	181	190	189	233	3,475
1979	317	369	320	340	268	213	189	185	177	180	220	270	3,048
1980	322	326	231	201	175	174	189	203	184	197	190	235	2,627
1981	288	355	361	409	266	197	183	213	238	243	297	357	3,407
1982	377	351	189	226	181	184	169	192	190	177	179	173	2,588
1983	163	200	165	187	174	172	166	167	175	198	176	172	2,115
1984	167	186	167	184	205	189	183	191	184	184	206	237	2,283
1985	323	471	208	288	464	310	236	228	216	230	311	386	3,671
1986	391	350	284	352	188	166	202	215	207	196	190	227	2,968
1987	305	416	402	775	655	323	246	247	245	254	313	459	4,640
1988	478	387	279	380	282	255	265	298	272	258	383	536	4,071
1989	490	377	338	626	680	291	184	185	194	221	306	353	4,245
1990	360	453	445	870	614	323	267	246	228	253	393	501	4,953
76 - 90 AVG	349	358	290	421	393	270	230	232	224	233	285	348	3,635

SJR @ Prisoners Point (40)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	108	78	118	617	657	369	231	184	149	142	304	405	3,362
1977	319	281	261	493	753	514	325	297	307	376	466	575	4,967
1978	506	386	245	106	96	69	61	62	53	60	67	114	1,825
1979	213	266	224	210	97	65	54	58	56	57	107	169	1,576
1980	231	236	119	59	46	42	52	63	56	64	67	119	1,154
1981	184	248	275	320	141	62	52	85	107	121	195	273	2,063
1982	288	262	64	73	48	52	38	46	55	50	57	51	1,084
1983	42	63	44	53	45	44	37	36	39	55	47	46	551
1984	46	50	46	45	56	51	49	59	63	63	90	130	748
1985	234	405	88	176	378	181	103	103	89	110	212	307	2,386
1986	289	237	176	241	61	42	58	67	68	63	68	116	1,486
1987	211	324	324	767	608	202	99	95	107	127	203	383	3,450
1988	351	219	159	279	142	99	120	173	152	142	296	485	2,617
1989	416	279	242	582	630	177	57	57	68	102	207	268	3,085
1990	277	369	367	880	558	205	147	124	111	143	312	446	3,939
76 - 90 AVG	248	247	183	327	288	145	99	101	99	112	180	259	2,286

SJR @ Prisoners Point (40)
Maximum Flow
Dissolved Organic Compound
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2457	2585	2933	3432	3890	3773	3398	3429	3566	3356	3211	2893	38,923
1977	3050	3116	3209	3660	3967	3941	3544	3509	3696	3778	3758	3419	42,647
1978	3385	3276	3475	5501	6160	5084	4150	3385	2930	3325	2988	2855	46,514
1979	2779	2766	2977	4492	6004	4433	3188	2916	2716	2955	2869	2742	40,837
1980	2601	2571	3063	4234	5355	4465	3423	3127	2910	3334	3014	2858	40,955
1981	2724	2820	2984	3476	3993	3728	3015	3117	3502	3435	3187	2808	38,789
1982	2706	2744	3382	4741	4989	4499	3744	3228	3053	3090	2920	2698	41,794
1983	2486	3378	3587	4302	5539	4428	4252	3278	3900	3597	3009	2760	44,516
1984	2591	3016	3715	4247	4734	3743	2962	2973	2839	2900	2816	2694	39,230
1985	2564	2886	3323	3432	4013	4452	3530	3195	3363	3291	3180	2866	40,095
1986	2915	2912	3201	3872	5095	4328	3806	3346	3187	3403	2958	2709	41,732
1987	2602	2762	2962	3322	4045	4027	4014	3824	3731	3669	3670	3353	41,981
1988	3361	3260	3253	3657	4638	4859	3941	3423	3450	3368	3385	3103	43,698
1989	3009	2870	3081	3566	4330	3563	2749	2958	3226	3199	3118	2781	38,450
1990	2629	2795	3109	3330	4075	4100	3280	3132	3030	3083	3109	2917	38,569
76 - 90 AVG	2,791	2,917	3,217	3,951	4,722	4,228	3,533	3,256	3,273	3,318	3,146	2,897	41,249

SJR @ Prisoners Point, 40
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	213	323	741	861	680	437	314	284	266	276	327	335
1977	387	408	429	816	709	485	341	385	359	366	476	586
1978	572	497	360	267	263	238	220	234	188	177	207	245
1979	324	380	952	668	277	210	226	252	181	182	234	284
1980	314	320	495	242	178	176	214	253	198	176	193	241
1981	325	430	1127	848	337	206	201	223	227	244	278	322
1982	373	386	192	225	189	187	170	198	190	173	193	179
1983	174	200	163	178	173	171	171	170	181	199	171	171
1984	182	180	167	177	201	183	202	228	183	180	204	240
1985	315	451	248	299	454	295	232	229	204	221	286	344
1986	382	362	571	452	198	168	220	252	217	182	201	238
1987	305	421	1134	1112	663	318	262	264	247	250	309	448
1988	431	343	700	579	277	251	252	257	253	268	392	480
1989	420	343	318	594	693	311	187	182	189	222	307	354
1990	346	397	383	752	528	299	235	224	211	252	374	457
Average	338	363	532	525	388	262	230	242	220	225	277	328

SJR @ Prisoners Point, 40
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	105	231	738	871	644	355	200	153	134	153	231	247
1977	256	272	311	551	666	404	230	278	262	274	407	542
1978	483	383	255	105	87	70	58	67	55	53	92	137
1979	225	291	991	608	107	63	72	87	53	60	124	186
1980	222	228	435	105	48	42	62	84	62	51	75	129
1981	235	349	1201	853	227	74	62	74	85	112	169	231
1982	286	304	69	73	51	53	38	49	55	48	74	62
1983	48	63	44	49	44	44	37	36	40	58	45	46
1984	52	47	46	44	53	48	60	76	55	57	88	134
1985	226	384	133	190	369	169	89	83	72	100	183	257
1986	288	263	523	383	64	43	63	80	71	56	85	130
1987	213	341	1211	1175	618	198	106	103	106	123	203	376
1988	319	213	675	521	144	96	93	118	124	148	305	419
1989	323	236	219	543	649	202	61	54	66	106	209	270
1990	260	313	298	738	456	180	106	89	87	138	288	393
Average	236	261	477	453	282	136	89	95	88	102	172	237

SJR @ Prisoners Point, 40
Cumulative Impact
Dissolved Organic Compound
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2403	2515	2820	3335	3832	3595	3331	3466	3691	3710	3117	2804
1977	3094	3161	3332	3811	4149	3959	3453	3447	3218	3402	3549	3282
1978	3253	3162	3424	5460	5921	5107	4363	3610	2954	2937	2810	2719
1979	2703	2684	2841	4442	6047	4397	3673	3566	2767	2878	2871	2744
1980	2553	2576	3037	4282	5340	4522	3819	3530	2993	3003	2835	2807
1981	2614	2715	2872	3377	3974	3687	3354	3383	3504	3702	3229	2789
1982	2668	2736	3360	4772	4764	4523	3839	3301	3022	2936	2856	2625
1983	2686	3457	3602	4206	5523	4453	4262	3297	3869	3658	2957	2789
1984	2867	3039	3718	4270	4915	3748	3200	3349	2900	2874	2806	2682
1985	2498	2835	3281	3443	3950	4222	3792	3478	3218	3297	3144	2822
1986	2801	2806	3149	3833	4998	4362	4159	3660	3252	2964	2811	2693
1987	2564	2689	2855	3274	4029	3963	4219	3901	3668	3607	3522	3197
1988	3116	3007	3092	3627	4349	4802	4087	3493	3495	3563	3444	3017
1989	2984	2861	3081	3551	4190	3513	2824	2928	2963	3108	3127	2783
1990	2580	2697	3045	3306	3982	3882	3384	3345	3126	3256	3196	2910
Average	2760	2863	3167	3933	4664	4182	3717	3449	3243	3260	3085	2844

Collinsville (435)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1578	1688	2898	3497	3590	2944	3793	4931	4168	5381	5872	5918	46,258
1977	9236	10221	9494	7394	4505	4126	5379	6404	6925	7547	8353	8846	88,430
1978	7526	7015	4814	358	178	174	179	191	934	2005	3144	2674	29,192
1979	6805	8475	8176	1082	207	183	603	1460	1108	2313	3273	4663	38,348
1980	6330	4516	2026	210	164	166	205	391	1101	1921	2660	3812	23,502
1981	6928	8236	3922	372	192	178	749	3140	3977	3493	4263	4928	40,378
1982	6404	900	162	172	161	171	155	161	183	762	1191	503	10,925
1983	197	168	161	174	160	155	160	155	158	187	245	176	2,076
1984	214	162	156	161	167	166	383	1590	1872	2050	2395	4045	13,361
1985	7136	886	392	2524	1716	876	2815	2786	3235	3420	4589	5138	35,313
1986	6413	6151	3922	1275	175	157	178	387	1154	2026	2943	4563	29,344
1987	8347	9965	6901	4160	1992	602	1148	3234	3968	4402	5878	6297	56,894
1988	7171	7586	5735	1110	1104	3277	4511	4724	4111	5482	7663	7938	60,410
1989	8597	8767	8514	6783	5186	505	363	1388	3021	3835	5411	5365	57,735
1990	8368	9773	9236	4787	2479	3040	2626	3587	3968	5178	7056	7627	67,725
76 - 90 AVG	6,083	5,634	4,434	2,271	1,465	1,115	1,538	2,302	2,659	3,332	4,329	4,833	39,993

Collinsville (435)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1755	1888	3350	4070	4179	3399	4426	5804	4878	6347	6946	7005	54,047
1977	11024	12212	11326	8784	5286	4830	6346	7585	8213	8963	9940	10541	105,050
1978	8947	8320	5647	257	42	41	44	64	965	2264	3643	3077	33,311
1979	8082	10104	9740	1133	63	47	564	1605	1181	2638	3801	5486	44,444
1980	7506	5310	2293	94	37	38	84	310	1169	2162	3058	4455	26,516
1981	8230	9814	4588	286	65	52	743	3637	4650	4067	5000	5807	46,939
1982	7595	934	41	40	36	41	33	37	60	763	1283	452	11,315
1983	83	43	37	42	34	33	36	34	35	42	133	58	610
1984	102	40	34	36	38	39	303	1764	2104	2320	2739	4739	14,258
1985	8484	917	315	2893	1911	892	2997	3208	3754	3979	5396	6062	40,808
1986	7606	7287	4584	1372	54	34	52	302	1229	2283	3396	5363	33,562
1987	9948	11907	8196	4875	2244	563	1222	3748	4638	5186	6955	7464	66,926
1988	8523	9025	6780	1176	1166	3799	5294	5556	4814	6473	9115	9445	71,166
1989	10248	10451	10144	8048	6108	451	281	1523	3498	4483	6390	6336	67,961
1990	9975	11675	11019	5631	2831	3508	3015	4181	4643	6106	8381	9072	80,037
76 - 90 AVG	7,207	6,662	5,206	2,582	1,606	1,184	1,696	2,624	3,055	3,870	5,078	5,691	46,463

Collinsville (435)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2335	2282	2448	2752	3091	3054	2565	2357	2665	2587	2477	2297	30,910
1977	1891	1817	1980	2377	3009	3033	2528	2323	2443	2539	2555	2424	28,919
1978	2423	2387	2760	3369	4017	3163	2862	2807	2733	2659	2693	2564	34,437
1979	2044	1838	1954	3285	4353	3481	2739	2491	2637	2589	2611	2365	32,387
1980	2119	2164	2681	2954	3894	3243	2791	2658	2714	2660	2679	2461	33,018
1981	2072	1893	2470	3013	3681	3099	2669	2407	2493	2513	2471	2318	31,099
1982	2099	2412	2872	3165	3786	3184	2243	2691	2588	2621	2696	2601	32,958
1983	2413	2646	3041	3313	3781	2656	2584	2635	2528	2896	2881	2528	33,902
1984	2492	2485	2926	3014	3790	3081	2539	2405	2610	2649	2665	2394	33,050
1985	1976	2426	2924	2884	3376	3340	2748	2511	2551	2515	2448	2320	32,019
1986	2125	2149	2608	3179	3721	2770	2768	2729	2825	2805	2819	2455	32,953
1987	1937	1721	2144	2606	3353	3179	2764	2513	2558	2450	2368	2272	29,865
1988	2079	1987	2340	3026	3454	3241	2580	2296	2472	2393	2272	2221	30,361
1989	2069	2007	2049	2417	2904	2853	2389	2361	2417	2413	2370	2305	28,554
1990	1889	1745	1930	2553	3244	3303	2562	2256	2403	2359	2281	2200	28,725
76 - 90 AVG	2,131	2,131	2,475	2,927	3,564	3,112	2,622	2,496	2,576	2,577	2,552	2,382	31,544

Collinsville (435)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	1714	2750	5161	5069	4246	3025	3830	5258	4288	4426	6024	6513	46,258
1,977	9630	10779	10334	7744	4601	4213	5517	7020	7481	7640	8357	9001	88,430
1,978	7647	6780	4529	348	184	178	174	206	862	1908	2278	4056	29,192
1,979	8357	8771	6415	1160	221	180	602	1729	1264	2051	2919	3797	38,348
1,980	5707	4037	1619	208	165	163	221	420	1296	1962	2643	4534	23,502
1,981	8179	9417	6482	875	266	204	1494	3812	4079	4503	5488	5603	40,378
1,982	6608	816	160	173	163	171	155	159	186	943	1430	592	10,925
1,983	236	168	162	174	159	155	153	154	158	166	267	191	2,076
1,984	252	169	156	161	165	163	357	1502	1797	1891	2218	3539	13,361
1,985	6854	1051	372	2243	2718	1730	2634	2685	3265	4066	5991	6317	35,313
1,986	6629	6042	3878	1167	173	157	175	391	1138	1842	2085	3643	29,344
1,987	8037	9982	6824	3959	1899	580	1178	3343	4044	4845	6517	8244	56,894
1,988	8610	8578	6207	1177	1151	3315	4658	5606	4394	5305	7698	8679	60,410
1,989	9480	8930	8486	6835	5296	480	367	1463	2483	3825	5385	5615	57,735
1,990	8642	10109	9585	4418	2284	2899	2587	3350	3892	4938	6545	7782	67,725
76 - 90 AVG	6,439	5,892	4,690	2,381	1,579	1,174	1,607	2,473	2,710	3,355	4,390	5,207	39,993

Collinsville (435)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	1919	3174	6092	5975	4974	3497	4472	6201	5024	5192	7130	7725	54,047
1,977	11501	12886	12344	9208	5403	4935	6513	8331	8888	9076	9944	10728	105,050
1,978	9089	8027	5299	245	46	43	42	87	881	2146	2595	4754	33,311
1,979	9960	10461	7608	1229	83	47	565	1932	1371	2324	3375	4439	44,444
1,980	6752	4731	1801	84	37	37	108	347	1406	2212	3037	5329	26,516
1,981	9745	11245	7690	897	159	87	1647	4453	4775	5289	6482	6623	46,939
1,982	7842	833	39	41	37	41	33	36	66	982	1572	559	11,315
1,983	131	44	38	42	34	33	35	34	35	43	162	76	610
1,984	150	45	34	36	37	38	272	1657	2014	2130	2526	4127	14,258
1,985	8142	1116	293	2554	3125	1923	3019	3088	3816	4786	7091	7487	40,808
1,986	7867	7153	4530	1242	51	34	52	311	1211	2062	2382	4252	33,562
1,987	9573	11928	8103	4632	2133	537	1259	3882	4731	5702	7726	9819	66,926
1,988	10264	10222	7350	1257	1219	3841	5471	6621	5154	6256	9155	10344	71,166
1,989	11317	10651	10088	8111	6241	421	286	1612	2847	4470	6359	6639	67,961
1,990	10307	12081	11444	5185	2596	3339	2969	3896	4553	5817	7763	9261	80,037
76 - 90 AVG	7,637	6,973	5,517	2,716	1,745	1,257	1,783	2,833	3,118	3,899	5,152	6,144	46,463

Collinsville (435)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2327	2172	2189	2546	2989	3040	2549	2303	2634	2649	2428	2260	30,910
1,977	1860	1759	1886	2343	2993	3018	2522	2265	2374	2548	2597	2475	28,919
1,978	2507	2534	2823	3355	4131	3176	2756	2723	2722	2696	2735	2405	34,437
1,979	1937	1849	2159	3280	4216	3357	2654	2445	2532	2490	2518	2350	32,387
1,980	2105	2181	2722	3033	3862	3132	2653	2597	2688	2675	2686	2385	33,018
1,981	1956	1784	2187	2905	3573	3001	2516	2277	2453	2442	2421	2307	31,099
1,982	2107	2407	2869	3168	3782	3152	2233	2677	2599	2610	2687	2606	32,958
1,983	2399	2595	3029	3303	3775	2654	2571	2634	2534	2877	2877	2520	33,902
1,984	2462	2474	2923	3003	3766	3037	2527	2430	2589	2578	2597	2386	33,050
1,985	1972	2431	2681	2814	3157	3377	2754	2430	2455	2430	2365	2298	32,019
1,986	2168	2200	2620	3165	3716	2760	2758	2727	2838	2813	2757	2416	32,953
1,987	1914	1704	2148	2601	3346	3175	2706	2435	2535	2448	2398	2207	29,865
1,988	2101	2032	2335	3021	3469	3317	2654	2311	2566	2526	2330	2183	30,361
1,989	2012	1989	2033	2397	2884	2835	2382	2367	2482	2393	2365	2279	28,554
1,990	1868	1708	1890	2582	3255	3268	2515	2241	2356	2339	2301	2164	28,725
76 - 90 AVG	2,113	2,121	2,446	2,901	3,528	3,087	2,583	2,457	2,557	2,568	2,537	2,349	31,544

Collinsville (435)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1546	2639	5036	4957	4160	2963	3718	4899	4172	3991	6215	6711	51,007
1977	10067	11146	10388	8422	4772	4150	5392	6787	7361	7646	8377	9035	93,543
1978	7667	7316	4873	346	183	175	174	204	919	1798	2234	4071	29,960
1979	8256	8676	6651	1219	221	180	590	1490	1171	2222	2985	3837	37,498
1980	5335	3724	1351	191	164	164	222	420	1159	2021	2834	4635	22,220
1981	7314	8255	6100	808	254	191	1532	3817	4069	4799	5788	5532	48,459
1982	6490	741	159	172	161	171	155	160	182	955	1379	531	11,256
1983	226	168	160	174	159	155	160	155	158	167	268	188	2,136
1984	249	163	156	161	167	164	356	1506	1801	1894	2234	3541	12,392
1985	6139	921	357	2339	2722	1377	2539	2696	3162	4071	6213	6128	38,664
1986	6719	6208	3753	1152	172	157	177	396	1048	1864	2100	3583	27,329
1987	7921	9848	6726	3892	1856	567	1150	3273	4018	4841	6518	8214	58,824
1988	9262	9457	6402	1114	1100	3259	4560	5541	4309	4665	7076	8079	64,824
1989	9250	8973	8399	6734	5121	489	371	1429	2722	4152	6171	5805	59,616
1990	8407	9939	9553	4191	2177	2827	2560	3501	3898	4436	6527	7618	65,634
76 - 90 AVG	6,323	5,878	4,671	2,391	1,559	1,133	1,577	2,418	2,677	3,301	4,461	5,167	41,557

Collinsville (435)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1716	3040	5940	5840	4869	3423	4336	5767	4885	4667	7362	7965	59,810
1977	12030	13336	12411	10028	5608	4858	6362	8050	8743	9085	9968	10768	111,247
1978	9113	8682	5720	243	45	42	42	84	949	2012	2542	4770	34,244
1979	9837	10346	7894	1299	84	46	551	1643	1258	2531	3455	4488	43,432
1980	6303	4352	1476	69	36	37	107	346	1240	2283	3270	5452	24,971
1981	8697	9837	7226	816	145	71	1693	4459	4763	5646	6845	6537	56,735
1982	7699	743	38	40	36	41	33	36	59	996	1510	486	11,717
1983	119	43	37	42	34	33	35	34	35	43	162	72	689
1984	145	41	34	36	37	38	271	1661	2018	2133	2546	4130	13,090
1985	7277	959	275	2670	3129	1496	2904	3101	3667	4767	7380	7258	44,863
1986	7976	7354	4380	1224	51	34	51	312	1100	2087	2378	4179	31,126
1987	9433	11767	7984	4551	2082	521	1226	3798	4699	5697	7728	9783	69,269
1988	11053	11287	7588	1182	1158	3773	5352	6543	5052	5484	8404	9619	76,495
1989	11039	10703	10007	7989	6030	432	292	1571	3136	4866	7310	6869	70,244
1990	10021	11876	11405	4911	2467	3251	2935	4078	4560	5210	7742	9063	77,519
76 - 90 AVG	7,497	6,958	5,494	2,729	1,721	1,206	1,746	2,766	3,078	3,834	5,239	6,096	48,363

Collinsville (435)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2336	2181	2202	2557	2998	3048	2540	2309	2596	2613	2368	2245	29,993
1977	1813	1699	1856	2293	3025	3038	2524	2261	2357	2520	2576	2460	28,422
1978	2479	2404	2752	3327	4127	3170	2757	2723	2714	2691	2710	2396	34,250
1979	1937	1843	2128	3283	4215	3355	2656	2460	2534	2478	2522	2348	31,759
1980	2126	2189	2752	3010	3861	3139	2662	2601	2701	2661	2657	2375	32,734
1981	2012	1855	2213	2901	3571	3020	2534	2282	2463	2441	2436	2340	30,068
1982	2127	2402	2867	3162	3778	3175	2229	2662	2579	2599	2686	2596	32,862
1983	2390	2596	3029	3307	3776	2653	2570	2634	2534	2677	2876	2516	33,758
1984	2460	2473	2923	3002	3765	3035	2527	2430	2589	2578	2595	2386	32,763
1985	2015	2432	2882	2825	3179	3338	2726	2449	2495	2440	2349	2312	31,442
1986	2146	2177	2632	3171	3715	2756	2776	2748	2851	2828	2782	2429	33,011
1987	1927	1717	2157	2608	3352	3176	2700	2429	2522	2434	2384	2198	29,604
1988	2016	1918	2302	3017	3472	3330	2637	2288	2516	2467	2306	2206	30,475
1989	2005	1961	2032	2406	2902	2830	2384	2373	2474	2381	2314	2295	28,357
1990	1893	1715	1879	2601	3263	3286	2547	2254	2362	2360	2281	2178	28,619
76 - 90 AVG	2,112	2,104	2,440	2,898	3,533	3,090	2,585	2,460	2,552	2,558	2,523	2,352	31,208

Collinsville (435)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1510	2694	5230	5190	4237	2964	3753	5001	4161	4358	6119	6721	51,938
1977	9658	10671	10248	7713	4545	4131	5402	6918	7465	7681	8386	9022	91,840
1978	7661	6785	4585	350	183	175	174	214	857	1894	2259	4047	29,184
1979	8282	8663	6157	1318	233	180	577	1714	1265	2089	2908	3790	37,176
1980	5760	4022	1610	203	164	164	226	423	1172	2060	2466	4414	22,684
1981	8414	9830	6592	1125	329	208	1440	3739	4033	4489	5493	5265	50,957
1982	6404	803	160	172	161	170	155	161	202	1051	1664	689	11,792
1983	253	167	160	174	160	155	160	155	158	167	269	189	2,167
1984	249	163	156	161	167	165	358	1508	1798	1893	2214	3536	12,368
1985	6890	1207	456	2234	2685	1734	2572	2627	3249	4376	6219	6331	40,580
1986	6695	6155	3911	907	165	157	178	401	1055	1867	2101	3580	27,172
1987	7929	9857	6728	3895	1861	566	1148	3279	4011	4849	6529	8060	58,712
1988	7901	7792	5868	1074	1090	3270	4614	5511	4338	5289	7698	8658	63,103
1989	9401	8908	8415	6759	5221	477	362	1432	2508	3851	5390	5595	58,319
1990	8564	9953	9438	4376	2242	2844	2536	3509	3937	5223	7129	8135	67,886
76 - 90 AVG	6,371	5,845	4,648	2,377	1,563	1,157	1,577	2,439	2,681	3,409	4,456	5,202	41,725

Collinsville (435)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1673	3107	6175	6121	4962	3423	4378	5890	4869	5109	7245	7977	60,929
1977	11535	12758	12241	9170	5335	4836	6374	8208	8870	9126	9981	10752	109,186
1978	9107	8034	5367	248	45	42	42	96	874	2128	2571	4740	33,294
1979	9869	10330	7296	1419	97	47	536	1914	1372	2369	3362	4431	43,042
1980	6817	4713	1789	82	37	37	113	349	1255	2329	2821	5184	25,526
1981	10029	11745	7823	1199	234	92	1582	4364	4719	5271	6488	6215	59,761
1982	7595	817	39	41	36	41	33	36	83	1112	1855	676	12,364
1983	152	44	37	42	34	33	35	34	35	43	163	73	725
1984	146	42	34	36	38	39	274	1664	2015	2132	2522	4123	13,065
1985	8186	1305	392	2542	3085	1927	2943	3019	3773	5136	7367	7504	47,179
1986	7946	7290	4570	928	42	34	52	319	1109	2091	2381	4175	30,937
1987	9444	11775	7987	4554	2087	520	1222	3802	4688	5705	7740	9595	69,119
1988	9403	9265	6937	1133	1145	3786	5416	6505	5084	6236	9154	10320	74,384
1989	11221	10624	10026	8019	6150	418	280	1575	2876	4502	6365	6614	68,670
1990	10211	11890	11265	5134	2546	3273	2907	4088	4606	6161	8468	9688	80,237
76 - 90 AVG	7,556	6,916	5,465	2,711	1,725	1,237	1,746	2,791	3,082	3,963	5,232	6,138	48,561

Collinsville (435)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2336	2175	2179	2542	3003	3050	2558	2333	2660	2669	2423	2251	30,179
1977	1867	1774	1897	2351	3004	3029	2514	2242	2354	2528	2585	2468	28,613
1978	2503	2533	2815	3352	4130	3181	2757	2727	2727	2709	2756	2409	34,599
1979	1946	1881	2187	3293	4236	3356	2649	2444	2533	2486	2520	2351	31,862
1980	2103	2184	2723	3034	3872	3133	2652	2597	2700	2697	2745	2399	32,839
1981	1929	1738	2175	2892	3560	3013	2532	2296	2477	2450	2424	2336	29,822
1982	2114	2404	2870	3169	3782	3160	2234	2677	2630	2624	2887	2611	32,962
1983	2406	2599	3025	3319	3780	2654	2577	2634	2533	2877	2876	2516	33,796
1984	2460	2475	2923	3011	3767	3048	2530	2430	2589	2578	2597	2387	32,795
1985	1972	2433	2936	2869	3164	3388	2765	2441	2467	2409	2357	2307	31,508
1986	2168	2198	2622	3152	3715	2760	2758	2726	2846	2817	2764	2425	32,951
1987	1926	1717	2158	2608	3352	3177	2758	2516	2616	2512	2452	2273	30,065
1988	2202	2145	2392	3025	3474	3336	2699	2367	2610	2563	2355	2202	31,370
1989	2031	2006	2049	2409	2896	2837	2383	2370	2481	2392	2364	2281	28,499
1990	1877	1727	1908	2589	3262	3271	2519	2233	2382	2341	2269	2156	28,534
76 - 90 AVG	2,123	2,131	2,457	2,908	3,533	3,093	2,592	2,469	2,574	2,577	2,545	2,358	31,360

Collinsville (435)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	1836	2713	5080	4992	4174	2944	3762	5256	4229	4407	6339	6587	52,319
1977	8888	9541	8543	6947	4439	4107	5430	6828	7279	7622	8399	9057	87,080
1978	7752	6992	4817	366	183	175	174	214	816	1870	2353	4102	29,814
1979	8260	8668	6161	1318	233	180	567	1703	1263	2286	2930	3760	37,329
1980	5941	4171	1641	203	164	164	226	422	1297	1981	2504	4442	23,156
1981	8405	9839	6598	1199	342	210	1431	3731	4065	4817	5418	5327	51,382
1982	6469	760	160	172	161	170	155	161	202	1030	1649	687	11,776
1983	310	170	160	174	159	155	160	155	158	168	269	194	2,232
1984	256	163	156	161	167	165	357	1506	1858	1900	2207	3528	12,424
1985	6733	1194	487	2299	2708	1760	2578	2647	3232	4755	6100	6140	40,633
1986	6190	5536	3709	1330	177	157	177	396	1141	1832	2112	3654	26,411
1987	7935	9844	6721	3894	1856	566	1147	3277	4001	4757	6486	8199	58,683
1988	8046	8641	6280	1152	1124	3302	4560	5527	4265	4928	7289	8285	63,401
1989	9170	8868	8423	6768	5127	500	355	1423	3005	4706	6194	5791	60,330
1990	8471	9966	9392	4251	2222	2837	2614	3311	3872	4360	6121	7099	64,516
76 - 90 AVG	6,311	5,804	4,555	2,348	1,549	1,159	1,580	2,437	2,712	3,428	4,425	5,123	41,432

Collinsville (435)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2068	3130	5994	5882	4886	3399	4389	6198	4951	5167	7511	7814	61,389
1977	10601	11386	10172	8243	5207	4807	6407	8099	8643	9054	9994	10795	103,408
1978	9216	8285	5647	266	45	42	42	96	824	2098	2686	4806	34,053
1979	9842	10336	7301	1419	97	47	523	1901	1370	2608	3388	4394	43,226
1980	7036	4893	1827	82	37	37	113	349	1407	2234	2869	5218	26,102
1981	10018	11754	7830	1288	251	94	1571	4355	4757	5666	6396	6288	60,268
1982	7673	765	39	41	36	41	33	36	83	1086	1836	674	12,343
1983	220	47	37	42	34	33	35	34	35	43	163	79	802
1984	154	42	34	36	38	38	272	1662	2087	2140	2513	4114	13,130
1985	7995	1289	429	2621	3112	1959	2950	3042	3751	5594	7222	7272	47,238
1986	7335	6541	4327	1439	57	34	52	312	1212	2048	2392	4265	30,014
1987	9450	11761	7978	4553	2081	519	1220	3798	4674	5591	7686	9763	69,074
1988	9583	10298	7440	1227	1186	3822	5348	6521	4993	5798	8660	9868	74,744
1989	10942	10576	10036	8030	6037	446	271	1566	3478	5535	7335	6851	71,103
1990	10099	11908	11211	4983	2520	3263	2999	3847	4527	5117	7249	8434	76,157
76 - 90 AVG	7,482	6,867	5,353	2,677	1,708	1,239	1,748	2,788	3,119	3,985	5,193	6,042	48,203

Collinsville (435)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2321	2177	2197	2555	2999	3048	2569	2331	2687	2696	2419	2273	30,272
1977	1953	1926	2108	2419	3010	3030	2537	2297	2406	2553	2593	2475	29,307
1978	2512	2513	2808	3375	4123	3183	2757	2727	2730	2712	2745	2403	34,588
1979	1943	1851	2183	3293	4239	3345	2639	2440	2532	2475	2534	2356	31,830
1980	2090	2178	2721	3026	3862	3120	2643	2585	2679	2689	2717	2384	32,694
1981	1918	1726	2166	2890	3564	3012	2529	2294	2521	2537	2523	2364	30,044
1982	2130	2404	2869	3168	3782	3153	2233	2677	2630	2629	2692	2611	32,978
1983	2429	2603	3022	3313	3776	2653	2572	2635	2534	2876	2876	2519	33,808
1984	2463	2474	2923	3003	3766	3037	2527	2429	2583	2578	2598	2388	32,769
1985	1982	2434	2933	2871	3168	3392	2769	2457	2502	2420	2424	2326	31,678
1986	2204	2220	2619	3168	3717	2760	2764	2736	2841	2834	2784	2422	33,069
1987	1926	1717	2158	2608	3352	3176	2785	2571	2685	2586	2498	2242	30,304
1988	2152	1987	2308	3019	3476	3436	2830	2452	2677	2572	2344	2200	31,453
1989	2018	1972	2031	2404	2903	2836	2382	2364	2443	2375	2391	2334	28,453
1990	1904	1722	1905	2596	3260	3286	2625	2325	2409	2428	2340	2218	29,018
76 - 90 AVG	2,130	2,127	2,463	2,914	3,533	3,098	2,611	2,488	2,591	2,597	2,565	2,368	31,484

Collinsville (435)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3812	4010	5386	4404	3931	3358	3889	5246	4201	5332	7635	7478	58,682
1977	8665	9036	8435	7143	4523	4673	5543	6603	7195	7531	8366	9042	86,755
1978	7688	7013	4752	377	190	176	174	222	808	1856	2485	4225	29,966
1979	8336	8712	6850	1250	223	180	572	2051	1404	2278	3182	4431	39,469
1980	6413	4661	1882	209	164	164	216	441	1269	2033	2651	4505	24,608
1981	7937	9269	6395	1413	372	207	1432	3761	3944	4788	6175	5772	51,465
1982	6551	761	180	173	162	171	155	161	202	1197	2109	811	12,613
1983	398	174	159	175	180	155	160	156	159	171	325	340	2,532
1984	460	173	156	162	167	165	358	1507	1799	1956	2184	3515	12,602
1985	7676	1444	549	2303	2730	1866	2607	2638	3187	4709	8438	6586	42,733
1986	6510	5825	3758	1324	177	157	177	396	1132	1976	2115	3627	27,174
1987	7937	9840	6722	3891	1859	563	1145	3275	3997	4728	6588	8290	58,835
1988	7640	6822	5439	1130	1122	3320	4518	5535	4306	5303	7760	8653	61,548
1989	8839	8429	8329	6821	5226	492	333	1432	2971	4844	6340	5838	59,694
1990	8448	9969	9441	4256	2217	2837	2629	4081	4129	5402	7447	8067	68,923
76 - 90 AVG	6,487	5,743	4,561	2,335	1,548	1,232	1,594	2,500	2,714	3,594	4,787	5,412	42,507

Collinsville (435)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	4459	4700	6364	5171	4594	3900	4541	6184	4917	6286	9078	8891	69,085
1977	10329	10772	10041	8478	5308	5491	6543	7827	8541	8944	9954	10778	103,006
1978	9139	8312	5570	277	48	43	42	105	814	2082	2845	4956	34,233
1979	9934	10389	8134	1337	85	47	530	2322	1540	2598	3692	5206	45,814
1980	7606	5488	2119	90	37	37	100	371	1372	2296	3044	5294	27,852
1981	9451	11065	7583	1546	287	90	1572	4390	4607	5625	7308	6826	60,350
1982	7772	766	39	41	36	41	33	36	83	1287	2392	824	13,350
1983	327	53	37	43	35	33	36	34	36	45	231	253	1,163
1984	400	53	34	36	38	39	273	1663	2016	2208	2486	4098	13,344
1985	9138	1592	504	2626	3139	2067	2984	3028	3692	5534	7628	7811	49,763
1986	7721	6887	4383	1431	57	34	52	312	1202	2223	2396	4232	30,930
1987	9453	11755	7979	4550	2085	515	1216	3790	4661	5546	7801	9867	69,218
1988	9081	8078	6407	1199	1184	3841	5293	6530	5042	6250	9226	10311	72,442
1989	10540	10042	9922	8094	6157	436	245	1574	3433	5457	7512	6907	70,319
1990	10072	11914	11270	4989	2515	3264	3016	4777	4834	8376	8853	9606	81,486
76 - 90 AVG	7,695	6,791	5,359	2,661	1,707	1,327	1,765	2,863	3,119	4,184	5,630	6,391	49,490

Collinsville (435)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2210	2102	2180	2585	2977	3040	2593	2362	2708	2629	2388	2276	30,050
1977	2029	1995	2123	2423	3021	3039	2560	2297	2404	2558	2592	2469	29,510
1978	2498	2486	2789	3424	4242	3205	2757	2731	2738	2715	2770	2422	34,775
1979	1949	1867	2124	3284	4224	3343	2641	2417	2551	2502	2548	2345	31,795
1980	2097	2156	2701	3030	3872	3138	2660	2606	2708	2729	2774	2415	32,886
1981	1995	1819	2214	2904	3577	3021	2520	2298	2631	2715	2574	2397	30,663
1982	2148	2406	2871	3176	3790	3170	2242	2688	2635	2626	2692	2619	33,063
1983	2446	2608	3013	3334	3785	2657	2580	2668	2546	2958	2856	2656	34,107
1984	2511	2486	2936	3015	3767	3048	2530	2430	2589	2571	2600	2389	32,872
1985	1920	2430	2929	2866	3158	3406	2821	2533	2678	2634	2489	2348	32,212
1986	2234	2287	2665	3179	3720	2764	2767	2738	2842	2827	2798	2428	33,249
1987	1927	1718	2157	2609	3352	3178	2851	2686	2873	2880	2740	2489	31,460
1988	2424	2421	2527	3040	3485	3563	2952	2460	2693	2634	2429	2283	32,911
1989	2130	2048	2049	2404	2901	2848	2381	2394	2611	2564	2440	2349	29,119
1990	1909	1722	1900	2597	3261	3289	2664	2320	2475	2380	2269	2179	28,965
76 - 90 AVG	2,162	2,170	2,479	2,925	3,542	3,114	2,635	2,508	2,645	2,661	2,597	2,404	31,842

Collinsville, 435
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2929	3241	3724	3627	3721	2236	3148	4248	3943	5471	5307	5946
1977	8216	9134	9145	7831	5299	3210	4920	6874	6349	8939	8203	8982
1978	7803	7352	4577	357	184	174	180	183	749	1812	2318	3840
1979	8080	8470	5247	1159	246	184	223	456	796	2153	3539	4584
1980	5879	4906	1906	229	165	165	178	205	701	1704	2183	4426
1981	8282	9714	5628	1816	459	284	460	1571	2921	4565	5174	5445
1982	6606	872	161	173	161	173	156	163	220	1232	2404	1261
1983	327	168	159	173	159	155	160	156	159	170	459	248
1984	212	159	156	161	166	167	249	358	1056	1612	2108	3555
1985	6618	1215	461	2307	2099	1226	1611	1727	2829	4682	5819	5949
1986	6772	6022	2755	990	172	158	174	216	787	1455	2156	3663
1987	7612	9585	5746	3838	1780	527	1125	3060	3804	4763	6817	8204
1988	7522	8060	4650	928	1091	1567	3128	4442	4067	5474	7699	7867
1989	8050	8167	7902	6511	5046	525	230	1413	3063	4706	6446	5838
1990	7692	8919	8612	3499	1908	1658	1914	3098	3801	5645	7237	7652
Average	6173	5732	4055	2240	1510	827	1190	1878	2350	3492	4511	5164

Collinsville, 435
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	3391	3769	4354	4231	4341	2544	3646	4977	4602	6448	6255	7036
1977	9786	10891	10896	9306	6242	3718	5789	8156	7516	8233	9764	10708
1978	9281	8728	5365	254	45	41	44	49	733	2030	2647	4491
1979	9626	10098	6196	1228	109	51	105	380	795	2445	4125	5392
1980	6960	5783	2149	114	37	38	52	77	675	1897	2482	5200
1981	9671	11606	6657	2035	391	183	395	1736	3364	5350	6092	6429
1982	7839	901	40	41	36	42	33	37	102	1331	2751	1369
1983	240	44	36	42	34	33	35	34	35	47	395	145
1984	100	38	34	36	37	41	140	268	1111	1791	2393	4147
1985	7857	1315	401	2832	2377	1315	1778	1923	3256	5500	6878	7040
1986	8039	7129	3174	1030	50	34	45	83	773	1596	2451	4276
1987	9060	11449	6801	4487	1989	472	1192	3526	4424	5588	7837	9766
1988	8942	9590	5467	957	1149	1722	3607	5204	4751	6454	9150	9358
1989	9584	9725	9404	7719	5940	476	121	1551	3547	5535	7641	6908
1990	9156	10641	10267	4074	2143	1839	2151	3585	4436	6668	8596	9102
Average	7315	6760	4749	2546	1661	837	1276	2106	2675	4061	5297	6091

Collinsville, 435
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2253	2118	2349	2627	2976	3023	2578	2439	2745	2735	2693	2340
1977	2039	1986	2075	2410	2970	3145	2558	2236	2396	2364	2411	2336
1978	2383	2352	2751	3415	4129	3159	2945	2993	2852	2634	2593	2363
1979	1920	1850	2270	3260	4335	3413	2709	2791	2738	2514	2505	2340
1980	2125	2118	2695	3019	3884	3178	2762	2825	2866	2682	2641	2342
1981	1920	1729	2258	2843	3567	3090	2604	2554	2765	2600	2757	2419
1982	2131	2408	2869	3174	3762	3207	2262	2740	2665	2593	2604	2571
1983	2448	2608	3009	3284	3775	2656	2577	2641	2505	2806	2811	2518
1984	2485	2460	2922	3020	3804	3095	2594	2652	2720	2599	2594	2377
1985	1981	2429	2876	2815	3265	3358	2924	2710	2728	2583	2543	2371
1986	2164	2200	2696	3135	3715	2777	2903	3055	3019	2747	2610	2381
1987	1937	1719	2235	2594	3365	3162	2884	2757	2873	2842	2685	2413
1988	2321	2124	2479	3015	3461	3626	3063	2584	2714	2668	2515	2369
1989	2164	2046	2086	2431	2910	2852	2385	2391	2517	2429	2387	2346
1990	1958	1774	1938	2650	3287	3249	2712	2479	2568	2441	2385	2251
Average	2149	2128	2501	2913	3547	3133	2697	2656	2711	2629	2582	2382

Old River @ Highway 4 (90)
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	258	253	222	304	495	497	472	414	429	340	408	442	4,534
1977	536	625	619	721	980	777	599	566	560	568	598	689	7,838
1978	741	685	525	371	334	345	320	273	238	242	231	287	4,592
1979	319	467	455	419	372	310	254	242	244	230	248	333	3,893
1980	438	455	312	289	187	192	242	264	246	233	223	291	3,372
1981	345	417	344	297	318	276	284	285	285	299	346	407	3,903
1982	488	505	251	316	279	218	180	232	232	216	201	208	3,326
1983	222	277	203	201	173	188	168	170	182	238	226	233	2,481
1984	237	195	170	183	283	272	235	236	256	227	222	290	2,806
1985	430	513	251	252	452	340	289	306	277	285	343	414	4,152
1986	490	510	390	399	231	183	236	260	269	295	241	302	3,806
1987	439	570	536	737	804	444	357	326	298	301	370	470	5,652
1988	495	468	376	434	359	296	355	407	408	324	452	606	4,980
1989	630	572	491	650	875	422	226	221	258	284	347	416	5,392
1990	471	601	588	952	961	483	374	362	322	304	425	567	6,410
76 - 90 AVG	436	474	382	435	474	350	306	304	300	292	325	397	4,476

Old River @ Highway 4 (90)
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	113	90	75	167	379	392	321	260	271	214	321	362	2,965
1977	410	488	495	660	973	731	463	386	386	435	518	644	6,589
1978	651	513	385	179	120	116	104	91	85	99	101	142	2,586
1979	179	347	349	270	153	108	84	88	103	93	129	224	2,127
1980	330	346	198	115	48	44	73	92	92	92	94	148	1,672
1981	207	280	222	130	118	93	101	113	148	169	250	320	2,171
1982	374	400	118	119	94	62	35	68	77	74	70	72	1,563
1983	75	111	58	57	42	49	35	34	41	82	75	80	739
1984	87	42	42	38	86	87	74	88	121	94	99	171	1,029
1985	326	412	118	116	336	192	125	149	140	172	246	328	2,660
1986	376	380	276	280	80	46	72	87	102	129	105	177	2,110
1987	326	463	460	702	757	312	175	146	159	189	277	396	4,362
1988	386	309	253	328	212	140	212	287	296	210	371	556	3,560
1989	532	430	375	586	818	304	88	87	138	172	250	333	4,113
1990	362	480	479	961	948	360	249	244	200	191	341	513	5,328
76 - 90 AVG	316	339	260	314	344	202	147	148	157	162	216	298	2,905

Old River @ Highway 4 (90)
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2869	2895	3215	4323	4819	4613	4595	4513	4805	4094	3522	3178	47,441
1977	3342	3492	3583	4257	4561	4711	4832	4947	4981	5236	4752	4116	52,810
1978	4013	3890	4026	6539	6887	6698	5859	4473	3574	3810	3626	3344	56,739
1979	3146	2977	3243	5111	6785	5974	4273	3571	3607	3677	3444	3180	48,988
1980	3006	2844	3243	5395	6082	5064	4809	3872	3558	3621	3476	3347	48,317
1981	3203	3099	3257	4782	5724	5304	4663	4256	3788	3388	3330	3112	47,906
1982	3116	3084	3636	6173	6372	5393	4410	4471	3649	3489	3298	3139	50,230
1983	3245	4312	4322	4668	5919	4876	4419	3232	4090	4424	3659	3472	50,638
1984	3509	3054	3836	4359	6001	5357	3802	3497	3682	3603	3382	3148	47,230
1985	2919	3157	3701	4104	4687	5017	4558	4168	3787	3391	3354	3139	45,982
1986	3175	3186	3577	4539	6334	5024	4747	4030	3795	4335	3803	3222	49,767
1987	3068	3050	3185	3922	4774	5118	5225	4838	3943	3482	3492	3262	47,359
1988	3232	3314	3409	4279	5026	5058	4337	3770	3877	3747	3776	3494	47,319
1989	3653	3434	3422	4170	5107	4447	3479	3235	3418	3355	3425	3105	44,250
1990	3060	3232	3479	3854	4637	5192	4035	3532	3686	3560	3623	3392	45,282
76 - 90 AVG	3,237	3,268	3,542	4,698	5,581	5,190	4,536	4,027	3,883	3,814	3,597	3,310	48,684

Old River @ Highway 4 (90)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	266	246	259	555	788	597	485	413	449	326	364	480	4,534
1,977	564	658	672	829	1053	801	658	547	592	629	625	721	7,838
1,978	777	720	497	369	426	402	302	250	240	271	232	309	4,592
1,979	415	512	453	430	315	255	238	242	222	213	281	366	3,893
1,980	427	422	287	264	306	263	225	256	249	243	228	315	3,372
1,981	411	502	494	442	296	232	227	271	301	301	368	459	3,903
1,982	516	492	246	313	274	298	187	226	233	215	209	212	3,326
1,983	201	234	207	181	131	123	165	172	180	232	224	218	2,481
1,984	218	193	169	185	279	248	234	253	241	219	241	307	2,806
1,985	417	527	293	305	537	414	308	315	299	290	359	482	4,152
1,986	520	508	389	404	308	175	227	260	272	269	225	293	3,806
1,987	414	552	541	830	850	441	325	310	298	302	384	534	5,652
1,988	653	555	434	478	460	326	359	385	427	337	433	626	4,980
1,989	707	610	487	656	889	420	221	221	235	264	348	423	5,392
1,990	480	618	618	948	885	465	380	387	334	308	407	549	6,410
76 - 90 AVG	466	490	403	479	520	364	303	301	305	295	327	420	4,476

Old River @ Highway 4 (90)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	128	97	134	475	736	511	344	269	294	201	268	395	2,965
1,977	462	545	550	784	1062	760	481	399	423	477	536	663	6,589
1,978	675	549	363	179	178	168	101	74	83	111	103	182	2,586
1,979	280	397	364	300	137	85	73	84	90	88	174	261	2,127
1,980	318	310	167	147	120	86	58	83	92	95	98	181	1,672
1,981	287	385	413	337	146	78	74	120	169	188	273	371	2,171
1,982	407	385	112	137	107	104	38	63	70	71	77	78	1,563
1,983	67	97	69	58	44	46	35	36	41	73	67	69	739
1,984	75	87	43	39	76	69	69	89	102	93	125	186	1,029
1,985	309	434	167	180	442	273	153	185	179	177	261	395	2,660
1,986	402	375	276	285	250	60	65	80	99	109	96	165	2,110
1,987	300	447	468	817	814	308	154	137	159	182	260	450	4,362
1,988	541	397	329	381	279	156	201	244	293	215	346	574	3,560
1,989	627	489	384	599	837	299	84	83	107	148	252	334	4,113
1,990	375	503	521	957	860	344	261	282	224	198	320	483	5,328
76 - 90 AVG	350	366	291	378	406	223	146	149	162	162	217	319	2,905

Old River @ Highway 4 (90)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2877	2830	3119	4162	4736	4642	4555	4375	4775	3954	3564	3250	47,441
1,977	3353	3446	3628	4279	4543	4697	4948	4853	5021	5429	5025	4300	52,810
1,978	4388	4032	3975	6537	8320	7637	5750	4058	3607	4064	3493	3329	56,739
1,979	3305	3053	3143	4922	6036	5176	4036	3563	3271	3241	3213	3082	48,988
1,980	2960	2837	3256	5052	7531	6389	4303	3745	3577	3712	3461	3335	48,317
1,981	3203	3082	3181	4132	4644	4441	3910	3915	3767	3546	3513	3209	47,906
1,982	3164	3089	3650	6137	6257	6563	4508	4442	3672	3491	3316	3148	50,230
1,983	2977	3766	4428	4713	5987	4809	4421	3267	4096	4292	3618	3322	50,638
1,984	3287	3063	3849	4400	5910	4916	3748	3657	3509	3331	3243	3103	47,230
1,985	2900	3159	3706	4055	4556	5208	4518	3685	3563	3446	3606	3333	45,982
1,986	3312	3233	3576	4508	7145	5244	4768	4040	3838	4117	3484	3106	49,767
1,987	3030	3055	3177	3854	4704	5120	4932	4590	3969	3730	3868	3598	47,359
1,988	3683	3479	3398	4274	5595	5388	4637	4173	4401	4011	3861	3580	47,319
1,989	3691	3369	3362	4139	5133	4473	3451	3419	3435	3322	3407	3131	44,250
1,990	3077	3205	3481	3857	4544	5075	3917	3349	3502	3461	3555	3416	45,282
76 - 90 AVG	3,280	3,247	3,529	4,601	5,709	5,319	4,427	3,942	3,867	3,810	3,615	3,349	48,684

Old River @ Highway 4 (90)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	259	244	257	552	781	590	462	405	407	308	354	494	5,113
1977	585	721	704	786	975	796	622	528	577	611	618	723	8,246
1978	782	699	532	375	428	403	302	249	240	249	226	308	4,793
1979	417	516	445	422	315	254	238	240	220	213	282	368	3,930
1980	429	405	274	261	317	274	226	257	248	238	229	321	3,479
1981	405	455	429	419	288	241	231	274	305	303	367	452	4,169
1982	499	470	240	313	275	241	183	227	232	216	208	211	3,315
1983	201	235	211	208	173	183	167	171	181	232	224	218	2,404
1984	218	193	171	186	277	246	234	253	241	220	241	308	2,788
1985	417	510	286	286	499	401	300	307	282	284	362	486	4,420
1986	517	524	389	393	338	203	243	263	272	286	229	293	3,950
1987	412	550	537	821	839	437	317	303	296	302	366	536	5,716
1988	666	603	488	491	477	327	356	390	395	302	389	570	5,454
1989	646	599	492	657	887	431	224	223	236	270	366	462	5,493
1990	479	612	613	932	848	447	365	362	316	304	392	553	6,223
76 - 90 AVG	462	489	405	473	514	365	298	297	297	289	324	420	4,633

Old River @ Highway 4 (90)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	114	89	131	472	728	502	335	267	273	189	256	413	3,789
1977	476	619	595	724	962	752	482	391	418	471	532	686	7,088
1978	679	531	406	184	167	147	99	80	86	103	99	170	2,751
1979	290	402	351	284	130	82	77	87	89	86	174	265	2,317
1980	320	288	150	93	111	88	67	89	93	95	101	185	1,680
1981	286	329	333	309	136	82	76	124	172	185	270	363	2,665
1982	385	356	104	118	91	74	36	66	77	75	77	75	1,534
1983	63	85	64	60	42	46	35	35	42	78	73	71	694
1984	76	42	43	39	85	76	74	92	103	94	125	189	1,038
1985	314	409	156	156	394	260	145	168	154	169	264	402	2,991
1986	402	393	275	272	140	56	75	88	103	121	100	168	2,193
1987	295	438	462	805	801	303	149	134	159	183	264	455	4,448
1988	569	468	396	397	283	156	204	254	274	187	296	507	3,991
1989	558	477	385	598	846	317	88	85	107	154	272	379	4,264
1990	376	502	512	936	813	319	239	245	201	196	302	487	5,128
76 - 90 AVG	347	362	291	363	382	217	145	147	157	159	214	320	3,103

Old River @ Highway 4 (90)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2873	2830	3116	4156	4731	4643	4429	4242	4482	3757	3555	3286	46,100
1977	3293	3352	3590	4444	4696	4729	4861	4704	4944	5346	4989	4288	53,236
1978	4160	3851	3949	6529	8335	7654	5753	4057	3607	3889	3439	3324	58,547
1979	3252	3026	3159	4938	6038	5173	4036	3529	3263	3287	3234	3080	46,015
1980	3088	2818	3254	5051	7536	6510	4351	3757	3576	3672	3450	3338	50,401
1981	3125	3051	3187	4130	4638	4657	3996	3900	3807	3672	3630	3232	45,025
1982	3174	3089	3645	6136	6278	5697	4452	4445	3668	3501	3317	3143	50,545
1983	2974	3766	4477	4715	5914	4806	4419	3246	4104	4292	3618	3321	49,652
1984	3284	3063	3849	4400	5909	4923	3757	3661	3510	3336	3244	3103	46,039
1985	2848	3135	3704	4124	4621	5111	4444	3846	3830	3465	3631	3311	45,870
1986	3276	3216	3571	4508	7356	5251	4881	4076	3838	4256	3531	3109	50,869
1987	3044	3052	3176	3855	4704	5120	4881	4498	3919	3687	3826	3577	47,339
1988	3576	3375	3376	4262	5687	5409	4516	4090	3979	3622	3747	3552	49,191
1989	3614	3329	3358	4137	4948	4400	3451	3449	3485	3365	3526	3181	44,243
1990	3048	3148	3463	3860	4590	5121	4014	3501	3464	3359	3548	3406	44,522
76 - 90 AVG	3,242	3,207	3,525	4,616	5,732	5,280	4,416	3,933	3,816	3,767	3,619	3,350	48,506

Old River @ Highway 4 (90)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	258	244	256	529	770	592	480	412	474	325	364	491	5,195
1977	574	660	672	825	1039	793	604	528	588	626	627	726	8,262
1978	781	722	498	370	426	402	302	249	240	308	236	310	4,844
1979	415	509	454	440	320	254	237	242	222	214	284	366	3,957
1980	428	427	289	265	317	269	225	256	249	273	236	312	3,546
1981	423	549	533	513	335	243	230	276	297	299	366	447	4,511
1982	492	484	245	313	274	298	187	228	233	218	213	216	3,401
1983	202	235	232	204	178	183	166	171	181	232	224	218	2,426
1984	218	193	171	186	277	246	234	252	241	220	241	307	2,786
1985	419	548	274	284	540	413	308	312	291	292	373	492	4,546
1986	524	519	394	387	317	203	239	261	272	274	227	293	3,910
1987	410	548	537	821	839	437	392	352	308	304	360	522	5,830
1988	626	537	402	452	472	325	369	381	432	341	428	623	5,388
1989	705	617	492	655	881	417	221	221	234	266	350	423	5,482
1990	479	614	611	939	877	465	378	383	333	306	428	597	6,410
76 - 90 AVG	464	494	404	479	524	369	305	302	306	300	330	423	4,700

Old River @ Highway 4 (90)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	113	89	128	443	713	505	341	265	289	198	267	410	3,761
1977	456	534	550	779	1044	749	476	391	422	478	541	669	7,089
1978	679	542	361	178	165	146	99	80	87	137	106	171	2,751
1979	283	391	366	307	135	82	76	88	91	89	177	262	2,347
1980	318	312	169	97	111	85	66	89	94	116	103	174	1,734
1981	304	444	460	426	195	89	76	120	161	184	271	358	3,088
1982	379	374	111	118	91	101	38	67	77	76	82	80	1,594
1983	64	86	78	58	44	46	35	35	42	78	73	71	710
1984	76	41	43	39	85	75	74	92	103	94	125	189	1,036
1985	313	454	142	158	445	271	152	179	169	178	277	408	3,146
1986	406	384	281	266	126	56	73	88	103	114	98	168	2,163
1987	293	436	461	806	802	304	186	158	158	178	249	435	4,466
1988	509	357	283	350	272	152	198	228	282	214	339	569	3,753
1989	623	490	383	594	824	295	84	83	106	150	254	334	4,220
1990	374	496	505	945	852	345	259	275	216	194	344	538	5,343
76 - 90 AVG	346	362	288	371	394	220	149	149	160	165	220	322	3,147

Old River @ Highway 4 (90)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2873	2829	3134	4196	4768	4647	4554	4438	4820	3969	3579	3275	47,082
1977	3362	3449	3635	4295	4556	4702	4820	4726	4974	5395	5009	4296	53,219
1978	4389	4033	3975	6535	8314	7634	5754	4059	3616	4210	3526	3328	59,373
1979	3313	3054	3137	4926	6057	5159	4020	3558	3271	3240	3212	3081	46,028
1980	2965	2840	3257	5054	7533	6390	4304	3745	3576	3974	3529	3330	50,497
1981	3178	3057	3174	4057	4564	4513	3960	4058	3816	3551	3512	3196	44,636
1982	3133	3077	3650	6136	6257	6564	4506	4461	3679	3536	3343	3154	51,496
1983	2981	3769	4814	4729	5983	4808	4419	3247	4104	4292	3618	3321	50,085
1984	3284	3063	3849	4400	5910	4918	3752	3657	3509	3337	3243	3103	46,025
1985	2920	3167	3749	3980	4544	5219	4523	3730	3584	3483	3657	3345	45,901
1986	3325	3251	3581	4491	7135	5244	4767	4039	3844	4157	3497	3107	50,438
1987	3026	3054	3177	3855	4705	5122	5135	4991	4199	3915	4033	3670	48,882
1988	3790	3599	3426	4276	5726	5430	4795	4349	4558	4108	3918	3603	51,578
1989	3726	3403	3374	4144	5154	4479	3452	3419	3436	3335	3407	3131	44,460
1990	3082	3217	3490	3860	4525	5054	3914	3430	3630	3547	3633	3455	44,837
76 - 90 AVG	3,290	3,257	3,581	4,596	5,715	5,326	4,445	3,994	3,908	3,870	3,648	3,360	48,969

Old River @ Highway 4 (90)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	274	247	258	550	780	590	497	419	513	333	372	500	5,333
1977	547	588	548	625	928	759	660	548	584	620	621	723	7,751
1978	793	729	526	374	417	395	302	249	241	308	236	312	4,882
1979	418	513	456	440	320	251	235	242	222	213	278	363	3,951
1980	433	434	290	265	317	269	225	256	249	265	232	312	3,547
1981	426	555	534	520	343	244	230	275	316	307	348	423	4,521
1982	489	472	242	313	274	296	187	228	233	218	212	215	3,379
1983	202	235	243	211	173	183	167	171	181	232	224	218	2,440
1984	218	193	171	186	277	246	234	252	241	220	241	307	2,786
1985	415	543	274	283	533	414	309	311	284	286	358	471	4,481
1986	504	466	366	403	324	202	240	261	272	294	229	294	3,855
1987	415	550	537	821	839	437	458	434	321	317	360	526	6,015
1988	630	517	456	490	486	353	367	392	411	314	406	597	5,419
1989	668	591	489	654	884	432	225	219	244	276	348	443	5,473
1990	474	611	606	923	860	453	361	324	315	294	371	510	6,102
76 - 90 AVG	460	483	400	471	517	368	313	305	308	300	322	414	4,662

Old River @ Highway 4 (90)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	131	92	132	469	726	502	343	267	302	203	276	421	3,864
1977	414	429	414	549	911	709	465	391	413	469	533	665	6,362
1978	689	549	390	183	162	143	99	80	87	137	106	174	2,799
1979	289	397	368	307	135	81	75	88	90	87	169	258	2,344
1980	323	322	170	97	111	85	66	88	94	111	100	175	1,742
1981	309	452	462	434	204	91	76	120	169	179	245	328	3,069
1982	372	358	106	118	91	101	38	67	77	76	81	80	1,565
1983	64	86	85	62	42	46	35	35	42	78	73	71	719
1984	76	42	43	39	85	75	73	92	103	95	125	188	1,036
1985	310	448	142	155	437	271	153	172	154	165	257	383	3,047
1986	386	328	249	285	135	56	74	88	103	126	99	170	2,099
1987	299	439	461	805	801	303	216	200	162	181	249	442	4,558
1988	523	362	358	396	290	168	177	212	251	189	315	540	3,781
1989	583	466	380	593	842	318	88	83	118	156	247	355	4,229
1990	370	497	505	926	829	327	222	191	192	181	277	435	4,952
76 - 90 AVG	343	351	284	361	387	218	147	145	157	162	210	312	3,078

Old River @ Highway 4 (90)
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2879	2830	3119	4162	4738	4640	4645	4549	4905	4035	3619	3280	47,401
1977	3437	3602	3566	4222	4550	4703	4977	4928	5052	5424	5020	4381	53,842
1978	4363	4057	4010	6547	8182	7543	5748	4058	3617	4213	3526	3327	59,191
1979	3275	3038	3136	4926	6059	5104	3989	3551	3271	3310	3248	3080	45,987
1980	2978	2846	3257	5055	7534	6389	4303	3741	3575	3895	3503	3326	50,402
1981	3164	3047	3170	4055	4569	4501	3947	4042	4110	3941	3668	3223	45,437
1982	3170	3069	3647	6137	6260	6530	4503	4462	3679	3549	3350	3155	51,531
1983	2987	3774	4984	4664	5910	4806	4419	3247	4104	4292	3618	3321	50,126
1984	3286	3063	3849	4400	5913	4917	3748	3657	3509	3337	3243	3103	46,025
1985	2896	3160	3750	4006	4562	5234	4534	3865	3688	3696	3715	3315	46,421
1986	3271	3172	3559	4517	7139	5243	4805	4055	3839	4271	3536	3109	50,516
1987	3044	3052	3176	3855	4704	5121	5194	5207	4390	4196	4003	3582	49,524
1988	3616	3371	3371	4263	5729	5828	5209	4798	4563	3877	3778	3536	51,939
1989	3614	3335	3363	4143	4945	4401	3452	3336	3490	3649	3717	3219	44,664
1990	3071	3178	3456	3852	4583	5118	4329	3673	3685	3474	3524	3356	45,299
76 - 90 AVG	3,270	3,241	3,561	4,587	5,692	5,339	4,520	4,078	3,965	3,944	3,671	3,353	49,220

Old River @ Highway 4 (90)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	320	281	286	668	863	596	512	439	467	350	434	589	5,805
1977	586	561	531	594	888	762	598	538	579	609	614	719	7,579
1978	780	715	513	373	429	403	302	249	241	309	234	308	4,856
1979	419	507	428	416	315	251	235	246	229	215	259	348	3,868
1980	439	460	312	268	316	272	227	259	251	291	241	312	3,648
1981	399	474	479	490	350	249	228	335	440	348	358	464	4,614
1982	506	474	242	314	275	277	183	230	234	227	219	221	3,402
1983	202	235	264	212	173	183	167	171	181	231	219	217	2,455
1984	215	193	171	186	277	246	234	252	241	220	243	306	2,784
1985	425	589	286	294	549	419	315	372	369	305	362	497	4,782
1986	534	505	381	406	322	202	241	262	272	308	234	294	3,961
1987	415	550	537	820	838	437	621	565	501	445	404	536	6,669
1988	655	595	382	438	495	427	376	384	470	360	419	622	5,623
1989	693	583	469	640	869	418	222	324	292	279	350	457	5,576
1990	477	612	610	925	858	453	369	339	322	304	442	612	6,323
76 - 90 AVG	471	488	393	470	521	373	322	331	339	320	335	433	4,796

Old River @ Highway 4 (90)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	187	133	166	617	832	508	350	276	282	214	341	523	4,429
1977	456	396	380	502	861	706	471	389	404	456	525	660	6,206
1978	676	539	379	182	167	147	99	80	87	137	102	168	2,763
1979	288	383	326	276	129	81	75	90	95	86	145	237	2,211
1980	326	351	196	101	111	87	67	90	95	128	105	174	1,831
1981	270	345	392	396	211	95	75	148	221	197	249	375	2,974
1982	393	361	106	118	91	91	36	68	77	81	87	86	1,595
1983	65	86	101	63	42	46	35	35	42	78	71	71	735
1984	74	42	43	39	85	75	74	92	103	94	127	187	1,035
1985	317	500	157	169	456	276	155	185	186	168	257	412	3,238
1986	409	354	263	288	134	56	75	88	103	134	103	169	2,176
1987	297	439	462	804	800	303	285	263	249	242	257	433	4,834
1988	531	387	243	331	284	207	178	213	280	220	321	564	3,759
1989	607	429	355	576	809	297	85	136	132	149	249	372	4,196
1990	374	499	508	928	826	327	220	187	185	189	360	557	5,160
76 - 90 AVG	351	350	272	359	389	220	152	156	169	172	220	333	3,143

Old River @ Highway 4 (90)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2906	2845	3118	4020	4581	4692	4770	4758	4850	4305	3931	3415	48,191
1977	3509	3598	3643	4333	4615	4872	4960	4872	5052	5419	5013	4300	54,206
1978	4307	3970	3971	6546	8364	7659	5755	4060	3625	4217	3596	3349	59,419
1979	3315	3097	3197	4951	6043	5102	3993	3603	3351	3406	3332	3159	46,549
1980	3045	2859	3259	5056	7522	6453	4356	3781	3601	4115	3613	3346	51,006
1981	3234	3137	3206	4110	4650	4562	3900	4321	4791	4405	3913	3301	47,530
1982	3182	3093	3651	6146	6275	6217	4446	4493	3699	3653	3429	3178	51,462
1983	2995	3780	5193	4679	5911	4806	4419	3247	4103	4260	3532	3289	50,214
1984	3228	3064	3849	4401	5910	4920	3752	3658	3509	3336	3243	3103	45,973
1985	2963	3200	3756	3986	4550	5270	4693	4366	4507	4101	3883	3397	48,852
1986	3454	3355	3610	4530	7122	5239	4825	4060	3839	4355	3564	3111	51,064
1987	3044	3051	3175	3855	4706	5125	4975	5278	5238	5071	4777	4127	52,422
1988	4371	4077	3530	4299	5933	6402	5464	4692	4793	4394	4185	3764	55,904
1989	3757	3372	3372	4153	5142	4478	3457	3928	4337	3980	3756	3227	46,959
1990	3064	3174	3461	3856	4582	5126	4500	4111	3926	3635	3693	3450	46,578
76 - 90 AVG	3,358	3,311	3,599	4,595	5,727	5,395	4,552	4,215	4,215	4,177	3,829	3,434	50,409

Old River @ Highway 4, 90
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	314	379	801	992	866	570	482	432	507	451	410	425
1977	510	535	590	676	845	678	489	475	490	466	531	669
1978	757	679	516	370	369	380	228	253	249	216	241	322
1979	431	525	976	882	346	249	281	378	244	210	276	366
1980	434	446	551	364	360	305	268	322	277	225	224	317
1981	439	572	1168	1097	467	262	270	353	441	462	355	414
1982	498	505	248	314	272	205	177	217	236	208	224	229
1983	208	233	259	251	173	191	172	173	196	233	211	212
1984	221	223	170	174	263	240	266	328	250	213	238	309
1985	422	564	317	318	538	395	348	390	308	291	340	441
1986	510	511	626	569	444	196	267	300	292	225	234	309
1987	413	562	1172	1344	867	431	592	492	467	407	374	523
1988	631	507	741	734	400	768	480	368	459	414	444	592
1989	605	508	445	607	859	438	239	249	246	272	349	455
1990	467	550	526	808	718	405	404	350	311	311	427	560
Average	457	487	607	633	519	381	331	339	332	307	325	410

Old River @ Highway 4, 90
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	187	255	791	1011	842	489	315	247	273	261	310	333
1977	363	363	405	567	789	592	351	323	375	354	449	615
1978	655	518	394	180	138	135	56	72	88	82	125	198
1979	307	414	998	841	165	80	97	148	90	84	166	259
1980	323	337	484	218	134	102	85	116	105	84	103	186
1981	327	472	1229	1135	351	114	98	144	203	235	232	317
1982	387	402	115	118	89	57	34	53	78	71	102	106
1983	69	83	100	84	42	50	35	35	49	78	69	70
1984	75	68	42	38	77	72	90	128	95	85	122	191
1985	315	478	195	197	446	257	160	172	136	152	232	350
1986	391	383	562	485	216	53	82	98	110	87	116	188
1987	302	461	1233	1439	836	299	262	221	230	225	248	433
1988	509	333	693	690	253	361	213	174	243	241	341	527
1989	493	363	326	537	815	327	99	95	107	148	247	372
1990	363	441	427	790	662	279	210	166	154	182	338	497
Average	338	358	533	555	390	218	146	146	156	158	213	309

Old River @ Highway 4, 90
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2827	2764	3011	3910	4458	4434	4600	4743	4976	5215	3846	3235
1977	3516	3662	3923	4585	4953	5039	4783	4620	4201	4565	4509	4069
1978	4009	3782	3902	6502	7438	7316	4532	3382	3649	3428	3233	3157
1979	3182	3021	3033	4910	6142	5095	4638	4276	3531	3265	3305	3165
1980	2981	2859	3216	4923	7967	6998	5287	4242	3839	3580	3284	3267
1981	3105	3019	3078	3984	4640	4488	4376	4508	4742	4961	4011	3256
1982	3125	3072	3628	6192	5988	5214	4363	3349	3664	3445	3308	3054
1983	3150	3868	5129	5434	5954	4922	4418	3232	4156	4157	3496	3245
1984	3456	3688	3880	4364	6021	5002	4178	4361	3653	3324	3219	3082
1985	2901	3158	3693	4070	4491	5033	5109	4771	4235	4060	3830	3321
1986	3291	3197	3525	4525	7997	5171	5005	3602	3996	3519	3232	3090
1987	2982	3002	3058	3802	4692	5040	4738	5206	5119	5069	4553	3905
1988	3842	3534	3351	4302	5241	5701	5684	4788	4772	5005	4343	3650
1989	3640	3352	3372	4140	4889	4368	3656	3794	3763	3726	3767	3233
1990	2987	3046	3344	3818	4465	4869	4714	4540	4147	4066	3886	3450
Average	3266	3268	3543	4631	5689	5246	4673	4228	4163	4094	3721	3345

Contra Costa Canal Intake, 247
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	310	378	877	1099	977	636	491	426	438	417	461	463
1977	533	559	614	746	944	746	542	506	533	510	606	753
1978	810	709	593	648	564	565	409	315	256	225	267	334
1979	452	564	1066	1049	437	280	292	364	252	228	309	392
1980	454	469	610	436	753	493	321	363	278	228	245	327
1981	470	626	1284	1242	533	293	288	322	354	374	383	449
1982	522	541	267	640	328	493	291	263	244	218	243	236
1983	206	281	346	795	632	582	304	225	251	242	212	208
1984	221	274	336	271	312	274	281	313	249	227	263	323
1985	443	625	341	352	631	444	366	353	301	303	383	483
1986	535	534	697	666	792	647	354	360	294	235	258	318
1987	432	605	1284	1482	1000	501	527	467	409	390	417	577
1988	661	506	814	860	434	556	473	381	412	407	507	663
1989	641	517	481	681	974	509	280	254	256	297	400	498
1990	484	578	574	902	810	439	379	324	319	340	494	631
Average	478	518	679	791	675	497	373	349	323	309	383	444

Contra Costa Canal Intake, 247
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	205	275	882	1105	934	536	346	255	255	251	360	384
1977	414	415	463	639	884	647	387	359	416	397	518	714
1978	741	584	465	300	190	195	130	103	91	88	147	224
1979	350	483	1107	974	204	89	99	143	94	95	197	298
1980	368	385	544	264	268	176	105	137	106	86	120	209
1981	382	558	1368	1267	394	126	102	127	159	197	265	365
1982	440	461	130	253	106	182	81	79	83	77	118	116
1983	70	114	144	327	205	184	90	61	85	83	69	70
1984	78	108	133	85	93	82	92	118	94	94	143	216
1985	383	556	215	215	513	292	172	155	133	164	276	405
1986	446	436	625	560	326	249	120	131	113	93	136	210
1987	344	537	1369	1576	935	334	248	209	204	220	286	504
1988	571	361	774	797	273	280	209	184	229	241	401	613
1989	561	400	377	596	922	391	116	95	114	169	299	432
1990	407	504	494	873	742	300	206	156	162	206	402	581
Average	383	412	606	655	466	270	167	154	156	164	249	356

Contra Costa Canal Intake, 247
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2915	2956	3244	4853	4984	4890	4939	5102	5474	5320	4142	3437
1977	3700	3848	4148	5253	5250	5446	5437	4997	4663	4898	4980	4446
1978	4454	4145	5050	12513	10448	10135	7474	5002	3970	3626	3415	3323
1979	3390	3170	3289	6919	7257	5690	5105	5468	3827	3500	3483	3356
1980	3099	3040	3864	6174	12890	9694	6272	5764	4142	3750	3459	3421
1981	3293	3205	3329	5135	5122	4850	4888	4998	5094	5176	4160	3492
1982	3249	3473	4141	13472	6807	9408	6176	4708	3906	3638	3472	3169
1983	3201	5136	7156	16891	12687	10714	6444	4378	4912	4448	3665	3388
1984	3570	4914	7218	6298	6719	5583	4732	4742	3876	3526	3396	3279
1985	2973	3929	4165	4643	5086	5362	5657	5354	4513	4286	3996	3573
1986	3490	3402	4567	5619	12576	10936	6879	5515	4310	3716	3412	3236
1987	3170	3160	3285	4599	5522	5697	5964	5798	5621	5275	4884	4194
1988	4089	3775	3898	5447	5390	6661	6189	5185	5334	5285	4747	4020
1989	3953	3633	3784	5005	5286	4686	4222	4089	3989	3943	3924	3300
1990	3141	3183	3607	4650	4811	5044	5159	4587	4521	4379	4245	3741
Average	3446	3665	4316	7165	7389	6986	5702	5046	4543	4318	3959	3558

Contra Costa Canal Intake (247)
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	252	229	274	638	883	661	504	436	444	349	417	526	4,844
1,977	602	719	740	934	1176	890	674	578	599	648	693	800	8,522
1,978	830	744	563	588	632	544	332	266	249	263	253	322	5,604
1,979	436	553	508	520	367	271	245	251	241	238	324	399	4,237
1,980	445	442	319	296	664	319	236	262	254	246	245	327	4,120
1,981	440	545	560	511	319	243	240	290	322	338	422	505	4,155
1,982	541	521	254	533	305	485	342	260	246	225	223	214	4,165
1,983	198	279	380	607	473	465	258	230	246	249	232	219	4,137
1,984	214	257	304	263	297	261	244	259	255	242	273	324	3,260
1,985	434	580	309	333	613	443	326	346	325	328	413	529	4,566
1,986	544	522	442	464	754	535	250	272	277	271	246	301	4,856
1,987	434	602	613	934	960	502	335	313	314	332	413	591	6,274
1,988	693	558	485	554	440	340	381	413	444	367	503	710	5,442
1,989	765	629	528	749	993	456	246	245	259	299	401	459	5,947
1,990	500	649	670	1066	986	498	424	414	367	350	472	617	7,003
76 - 90 AVG	489	522	463	599	656	461	336	322	323	316	369	456	5,143

Contra Costa Canal Intake (247)
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	127	90	152	554	830	562	372	291	303	222	321	460	3,280
1,977	525	643	656	905	1187	832	542	434	462	524	604	758	7,436
1,978	751	606	423	270	224	208	112	84	90	107	118	200	3,131
1,979	324	466	431	358	153	88	77	90	102	104	211	306	2,422
1,980	360	354	196	151	242	104	65	87	96	98	111	204	2,072
1,981	336	455	492	395	154	79	77	132	188	220	326	432	2,423
1,982	463	437	119	219	113	173	107	79	80	78	87	81	2,002
1,983	66	123	168	244	155	160	79	66	83	83	75	73	1,462
1,984	76	123	119	80	84	73	73	93	112	108	149	214	1,282
1,985	352	502	180	200	509	297	164	210	201	209	314	459	3,044
1,986	457	419	325	332	366	219	76	87	104	110	111	186	2,693
1,987	340	526	556	923	905	340	158	139	173	208	309	527	4,983
1,988	620	434	386	444	277	162	224	272	310	239	415	674	4,044
1,989	720	545	442	693	949	333	93	94	123	176	303	385	4,723
1,990	426	575	601	1082	940	367	293	312	251	234	384	563	6,004
76 - 90 AVG	396	420	350	457	473	266	167	165	179	161	256	368	3,400

Contra Costa Canal Intake (247)
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	2989	3025	3339	4760	4928	5041	4758	4663	4978	4213	3794	3463	51,357
1,977	3529	3578	3754	4676	4813	5198	5553	5289	5479	5746	5443	4755	57,408
1,978	4915	4394	5069	11342	11553	9858	6272	4503	3994	4346	3797	3572	74,820
1,979	3534	3205	3369	6367	6737	5491	4253	3910	3656	3611	3549	3381	54,670
1,980	3110	3017	3798	5853	12166	7180	4537	4075	3961	4012	3763	3584	60,223
1,981	3418	3263	3406	4892	4852	4578	4126	4257	4096	3874	3801	3502	51,855
1,982	3280	3447	4016	11140	6641	9512	6949	5155	4006	3801	3621	3341	66,251
1,983	3075	4986	7919	13364	10602	9675	6027	4567	5006	4742	3950	3564	80,611
1,984	3434	4476	6561	6012	6261	5169	4044	4003	3844	3684	3561	3408	56,785
1,985	3026	3916	4080	4402	4802	5285	4708	4016	3875	3788	3876	3624	50,751
1,986	3479	3405	4333	5174	12093	10118	5151	4423	4220	4393	3786	3358	64,339
1,987	3255	3211	3381	4381	5210	5642	5080	4823	4200	4002	4093	3864	51,771
1,988	3836	3590	3777	5005	5500	5555	4824	4486	4729	4352	4187	3890	51,118
1,989	3943	3535	3627	4635	5250	4552	3760	3799	3760	3668	3697	3237	47,918
1,990	3191	3300	3612	4332	4663	5206	4285	3406	3840	3852	3896	3738	48,306
76 - 90 AVG	3,468	3,623	4,269	6,422	7,071	6,537	4,955	4,358	4,243	4,139	3,921	3,619	57,879

Contra Costa Canal Intake (247)
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	243	227	271	634	874	654	493	431	420	336	406	543	5,532
1977	628	803	781	882	1089	882	656	561	586	636	688	803	8,995
1978	836	724	602	588	625	555	332	266	249	250	247	320	5,594
1979	440	560	498	510	373	271	245	249	238	236	324	402	4,346
1980	441	422	303	292	666	336	238	263	254	242	247	335	4,039
1981	436	487	480	485	309	246	243	294	325	336	420	495	4,556
1982	520	495	248	533	306	485	314	258	246	225	222	213	4,065
1983	198	279	381	606	499	510	272	230	246	250	232	219	3,922
1984	214	257	305	264	293	258	244	259	255	242	273	325	3,189
1985	438	562	300	312	573	431	317	333	301	320	417	535	4,839
1986	542	543	442	451	755	548	267	274	277	261	249	302	4,931
1987	432	600	609	923	948	497	330	309	313	333	416	594	6,304
1988	714	624	552	569	440	337	379	421	419	335	452	645	5,887
1989	692	617	533	750	991	469	249	247	259	305	424	506	6,042
1990	499	644	665	1047	922	472	401	381	344	344	454	621	6,794
76 - 90 AVG	485	523	465	590	644	463	332	318	315	311	365	457	5,269

Contra Costa Canal Intake (247)
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	114	84	148	549	820	553	363	292	288	213	308	480	4,212
1977	552	743	711	838	1077	824	530	426	454	518	602	763	8,038
1978	765	594	474	275	217	195	108	89	92	101	114	193	3,217
1979	332	475	416	343	150	86	78	92	100	101	211	309	2,693
1980	358	329	177	105	222	108	71	91	97	97	114	212	1,981
1981	338	385	394	364	144	79	78	137	190	214	321	420	3,064
1982	436	405	110	207	99	165	93	80	85	79	86	79	1,924
1983	64	114	161	237	152	160	79	66	82	88	79	75	1,357
1984	76	91	112	79	86	77	75	95	113	108	149	216	1,277
1985	360	478	168	174	455	288	155	189	169	199	318	466	3,417
1986	457	445	325	316	316	193	84	94	107	117	113	187	2,754
1987	337	519	549	909	890	335	154	137	174	211	314	532	5,061
1988	656	528	470	463	277	159	229	285	299	214	358	597	4,535
1989	638	534	447	696	959	356	97	95	122	183	328	441	4,896
1990	426	575	594	1059	885	337	267	269	226	231	384	570	5,803
76 - 90 AVG	394	420	350	441	450	261	164	162	173	178	252	369	3,615

Contra Costa Canal Intake (247)
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2985	3025	3337	4753	4923	5040	4642	4543	4677	4038	3788	3493	49,244
1977	3471	3488	3710	4778	4948	5176	5373	5078	5335	5598	5360	4697	57,012
1978	4630	4151	4970	11227	11435	10010	6265	4502	3999	4167	3742	3569	72,667
1979	3485	3176	3380	6380	6841	5489	4254	3882	3649	3645	3568	3381	51,130
1980	3075	2998	3792	5845	12149	7409	4588	4084	3965	3966	3752	3590	59,213
1981	3346	3228	3412	4887	4821	4717	4210	4255	4135	3982	3898	3528	48,419
1982	3287	3447	4011	11146	6658	9458	6514	5117	4001	3803	3623	3338	64,403
1983	3071	4989	7939	13090	10441	9664	6017	4558	5004	4742	3950	3560	77,025
1984	3431	4477	6560	6010	6200	5150	4050	4011	3847	3687	3561	3408	54,392
1985	2979	3895	4078	4454	4937	5200	4634	4173	3939	3806	3901	3604	49,600
1986	3451	3391	4326	5173	12089	10067	5275	4465	4223	4528	3834	3362	64,184
1987	3254	3211	3380	4382	5209	5639	5022	4739	4155	3960	4057	3843	50,851
1988	3709	3488	3745	4991	5498	5540	4650	4368	4240	3932	4016	3817	51,994
1989	3811	3453	3581	4576	5004	4419	3754	3826	3802	3705	3800	3283	47,014
1990	3163	3252	3599	4333	4699	5208	4281	3502	3757	3702	3832	3683	47,011
76 - 90 AVG	3,410	3,578	4,255	6,402	7,057	6,546	4,902	4,340	4,182	4,084	3,912	3,610	56,277

Contra Costa Canal Intake (247)
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	242	227	269	609	863	657	501	432	437	347	417	540	5,541
1977	614	722	739	930	1160	881	653	565	594	647	697	805	9,007
1978	834	746	564	588	632	544	331	266	250	275	256	322	5,608
1979	436	550	510	532	379	270	244	251	240	239	326	399	4,376
1980	446	448	321	296	666	324	236	262	254	266	252	323	4,094
1981	455	605	607	592	367	254	242	291	315	336	420	491	4,975
1982	512	512	254	533	304	485	340	259	246	227	227	219	4,118
1983	198	279	389	627	507	511	272	230	246	250	232	219	3,960
1984	214	257	305	264	293	258	244	259	255	242	273	324	3,188
1985	435	605	291	313	620	441	326	341	316	329	430	540	4,987
1986	549	535	447	445	742	546	262	272	278	273	247	301	4,897
1987	430	598	808	923	948	503	361	340	320	332	406	575	6,344
1988	658	529	445	527	435	339	379	403	437	367	498	705	5,722
1989	762	636	534	745	982	452	245	245	258	299	404	460	6,022
1990	499	843	661	1055	959	498	422	409	359	346	498	672	7,021
76 - 90 AVG	486	526	463	599	657	464	337	322	320	318	372	460	5,324

Contra Costa Canal Intake (247)
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	113	84	144	518	805	557	368	285	288	219	320	476	4,177
1977	529	634	654	898	1167	821	528	429	460	525	609	764	8,018
1978	755	603	421	271	218	191	108	89	92	117	120	194	3,179
1979	324	460	434	371	157	86	77	92	102	105	214	306	2,728
1980	360	360	199	110	223	103	70	91	97	111	115	198	2,037
1981	358	530	549	494	210	90	78	128	177	216	323	416	3,569
1982	429	425	118	207	98	167	104	81	85	81	92	86	1,973
1983	65	114	167	249	155	160	79	66	82	88	79	75	1,379
1984	77	91	112	79	86	77	75	95	113	108	149	215	1,277
1985	354	530	158	177	513	295	163	202	188	210	333	472	3,595
1986	463	432	331	310	301	191	82	93	107	112	112	187	2,721
1987	335	517	549	910	891	338	173	151	169	201	294	505	5,033
1988	574	383	331	409	264	157	214	252	294	236	407	668	4,189
1989	715	549	444	687	936	328	92	94	122	177	306	386	4,836
1990	424	566	585	1068	932	368	291	303	238	228	413	630	6,046
76 - 90 AVG	392	419	346	451	464	262	167	163	174	182	259	372	3,650

Contra Costa Canal Intake (247)
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2985	3025	3344	4790	4958	5045	4760	4724	5078	4235	3809	3484	50,237
1977	3539	3583	3761	4688	4823	5192	5371	5157	5433	5710	5426	4753	57,436
1978	4912	4387	5051	11327	11548	9857	6262	4504	4008	4505	3835	3574	73,770
1979	3531	3206	3361	6371	6863	5480	4239	3910	3658	3613	3549	3384	51,165
1980	3113	3021	3796	5853	12144	7183	4536	4071	3966	4278	3840	3581	59,382
1981	3394	3241	3398	4818	4845	4634	4172	4386	4141	3882	3802	3488	48,201
1982	3250	3435	4016	11154	6628	9510	6904	5142	4015	3848	3649	3351	64,902
1983	3079	4991	8023	13536	10613	9670	6018	4558	5004	4742	3951	3560	77,745
1984	3431	4477	6560	6010	6201	5148	4046	4008	3846	3686	3561	3409	54,383
1985	3033	3924	4146	4384	4878	5295	4719	4061	3895	3820	3923	3638	49,716
1986	3496	3424	4336	5153	12064	10061	5155	4419	4228	4431	3799	3360	63,926
1987	3254	3212	3381	4382	5210	5712	5464	5295	4491	4245	4313	3984	52,943
1988	3991	3747	3852	5102	5606	5614	4998	4653	4879	4439	4243	3912	55,036
1989	3979	3569	3639	4640	5264	4555	3758	3800	3762	3671	3697	3237	47,571
1990	3195	3313	3620	4333	4646	5188	4281	3478	3946	3925	3968	3775	47,668
76 - 90 AVG	3,479	3,637	4,286	6,436	7,086	6,543	4,979	4,411	4,290	4,202	3,958	3,633	56,939

Contra Costa Canal Intake (247)
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	263	230	273	632	873	654	505	436	454	353	427	550	5,650
1977	577	625	590	707	1042	845	661	572	587	639	691	802	8,338
1978	846	754	595	593	617	534	330	266	250	275	256	326	5,642
1979	440	556	512	533	380	268	243	250	240	236	319	395	4,372
1980	451	458	323	296	667	324	236	262	254	259	249	324	4,103
1981	460	613	609	599	377	256	242	291	327	331	395	461	4,961
1982	507	497	249	533	305	485	339	259	246	228	226	218	4,092
1983	198	279	389	609	496	510	272	230	246	250	232	219	3,930
1984	214	257	305	264	293	258	244	259	255	243	273	324	3,189
1985	433	599	291	311	613	442	328	337	304	318	409	517	4,902
1986	526	474	416	464	778	550	264	273	278	282	249	303	4,857
1987	436	601	608	923	948	503	382	373	329	336	404	582	6,425
1988	667	518	514	570	453	364	370	399	412	344	473	676	5,760
1989	720	608	530	744	991	474	252	246	272	308	400	483	6,028
1990	494	641	659	1036	939	483	390	332	340	332	430	569	6,645
76 - 90 AVG	482	514	458	588	651	463	337	319	320	316	362	450	5,260

Contra Costa Canal Intake (247)
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	137	88	150	546	818	553	369	285	297	223	331	488	4,285
1977	476	499	480	637	1026	779	522	422	446	513	601	758	7,159
1978	767	611	454	276	212	187	108	89	92	117	121	199	3,233
1979	331	468	436	371	157	85	77	92	102	101	205	301	2,726
1980	365	371	201	110	224	103	70	91	97	107	113	199	2,051
1981	364	540	552	503	222	93	79	129	180	201	290	379	3,532
1982	421	407	112	207	98	167	103	81	85	82	90	86	1,939
1983	65	114	168	241	151	160	79	66	82	88	79	75	1,368
1984	77	91	112	79	86	77	75	95	113	109	150	214	1,278
1985	352	523	158	173	504	296	164	193	170	191	306	443	3,473
1986	438	365	294	331	332	195	83	94	107	118	112	189	2,658
1987	341	521	549	909	891	337	185	169	170	197	292	516	5,077
1988	595	396	424	461	287	172	186	226	260	215	380	633	4,235
1989	669	521	441	686	953	358	99	96	137	181	296	411	4,848
1990	418	568	586	1044	906	347	243	204	214	213	333	507	5,583
76 - 90 AVG	388	406	341	438	458	261	163	155	170	177	247	360	3,563

Contra Costa Canal Intake (247)
Flow Study
Diesolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2992	3026	3338	4759	4929	5040	4843	4834	5240	4300	3846	3490	50,637
1977	3613	3735	3724	4630	4821	5194	5604	5366	5511	5739	5437	4821	58,195
1978	4896	4417	5083	11341	11289	9710	6245	4503	4009	4508	3835	3573	73,409
1979	3504	3188	3359	6370	6865	5439	4208	3903	3658	3665	3579	3384	51,122
1980	3121	3027	3796	5853	12147	7183	4536	4067	3963	4185	3810	3576	59,264
1981	3378	3229	3393	4816	4852	4628	4162	4371	4437	4229	3937	3519	48,951
1982	3284	3448	4014	11146	6632	9505	6891	5143	4015	3865	3656	3351	64,950
1983	3086	4998	7999	13072	10348	9663	6017	4558	5004	4742	3950	3561	76,998
1984	3433	4478	6560	6010	6206	5146	4043	4007	3846	3686	3561	3409	54,385
1985	3021	3918	4147	4400	4894	5303	4762	4203	4022	4035	4004	3638	50,347
1986	3470	3371	4356	5224	12249	10075	5193	4438	4224	4546	3839	3363	64,348
1987	3254	3211	3380	4382	5209	5708	5653	5684	4675	4496	4283	3898	53,833
1988	3793	3518	3788	5090	5608	5978	5407	5100	4881	4234	4109	3850	55,356
1989	3853	3497	3627	4638	5116	4484	3807	3755	3846	3976	3993	3341	47,933
1990	3203	3298	3624	4360	4692	5243	4597	3684	4004	3863	3871	3691	48,130
76 - 90 AVG	3,460	3,624	4,279	6,406	7,057	6,553	5,065	4,508	4,356	4,271	3,981	3,631	57,191

Contra Costa Canal Intake (247)
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	322	274	307	760	961	662	523	451	438	369	497	654	6,218
1977	623	590	563	664	1000	849	647	566	575	627	683	798	8,185
1978	833	740	581	593	632	546	332	266	250	276	252	320	5,621
1979	441	545	475	503	373	268	243	254	245	234	294	373	4,248
1980	456	488	349	300	668	329	238	264	257	278	255	324	4,206
1981	423	508	541	566	385	267	248	311	374	361	406	510	4,900
1982	530	504	255	592	322	490	320	261	247	234	233	225	4,213
1983	199	279	343	607	495	509	272	230	246	249	228	219	3,876
1984	212	257	305	264	293	258	244	259	255	243	275	322	3,187
1985	440	652	306	323	630	460	341	351	343	331	416	548	5,141
1986	561	518	443	478	847	556	264	273	278	290	253	302	5,063
1987	434	600	608	922	947	526	492	495	426	410	431	584	6,875
1988	686	592	425	521	461	433	389	411	443	384	488	700	5,933
1989	747	576	510	725	979	465	253	276	291	307	405	500	6,034
1990	498	642	663	1033	946	494	399	343	346	347	516	689	6,916
76 - 90 AVG	494	518	445	590	663	474	347	334	334	329	375	471	5,374

Contra Costa Canal Intake (247)
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	209	141	191	705	928	557	381	291	283	233	407	608	4,934
1977	526	455	436	576	967	777	516	422	432	499	592	755	6,953
1978	756	601	443	275	219	193	108	89	93	117	115	191	3,200
1979	330	449	384	333	150	85	77	94	105	97	173	271	2,548
1980	368	408	232	114	225	105	71	92	99	119	116	198	2,147
1981	314	405	466	461	229	99	81	137	193	211	293	432	3,321
1982	446	413	116	232	104	168	95	82	86	85	96	92	2,015
1983	65	114	142	240	151	159	79	66	82	88	76	75	1,337
1984	75	91	112	79	86	77	75	95	112	108	152	212	1,274
1985	356	584	176	189	525	307	167	181	174	188	305	475	3,627
1986	466	395	313	336	356	198	83	94	108	122	116	187	2,774
1987	340	521	549	908	890	347	238	228	214	232	286	495	5,248
1988	579	413	283	387	280	211	187	235	278	239	383	654	4,129
1989	693	476	411	653	921	339	97	108	129	169	298	430	4,724
1990	422	569	589	1037	909	353	242	196	205	222	430	648	5,822
76 - 90 AVG	396	402	323	435	463	265	166	161	173	182	256	382	3,604

Contra Costa Canal Intake (247)
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3023	3043	3340	4650	4790	5157	5087	5133	5204	4610	4213	3704	51,954
1977	3748	3790	3821	4785	4975	5343	5519	5323	5518	5735	5430	4757	58,744
1978	4829	4316	5044	11364	11545	9890	6265	4505	4019	4515	3900	3595	73,787
1979	3533	3241	3415	6392	6846	5436	4211	3951	3723	3743	3648	3464	51,603
1980	3185	3041	3799	5854	12144	7273	4589	4105	3994	4432	3920	3598	59,934
1981	3453	3313	3433	4879	4927	4783	4243	4792	5286	4797	4269	3728	51,903
1982	3380	3539	4112	12417	6894	9556	6596	5255	4039	3951	3736	3374	66,849
1983	3094	5003	7027	13023	10345	9649	6018	4557	5004	4706	3857	3538	75,821
1984	3382	4475	6557	6010	6201	5149	4047	4008	3846	3686	3561	3409	54,331
1985	3085	3958	4152	4390	4882	5512	5062	4951	5010	4572	4294	3853	53,721
1986	3751	3650	4671	5536	13095	10140	5215	4445	4226	4643	3869	3365	66,606
1987	3254	3211	3379	4382	5210	6031	6141	6259	5910	5591	5230	4598	59,196
1988	4766	4444	4123	5453	5858	6780	5839	5223	5317	4864	4663	4219	61,549
1989	4153	3653	3764	4913	5456	4666	3880	4409	4686	4362	4111	3400	51,455
1990	3261	3322	3666	4461	4799	5379	4897	4228	4356	4137	4147	3861	50,514
76 - 90 AVG	3,593	3,733	4,287	6,567	7,198	6,716	5,174	4,743	4,676	4,556	4,190	3,764	59,198

Contra Costa Canal Intake, 247
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	310	378	877	1099	977	636	491	426	438	417	461	463
1977	533	559	614	746	944	746	542	506	533	510	606	753
1978	810	709	593	648	564	565	409	315	256	225	267	334
1979	452	564	1066	1049	437	280	292	364	252	228	309	392
1980	454	469	610	436	753	493	321	363	278	228	245	327
1981	470	626	1284	1242	533	293	288	322	354	374	383	449
1982	522	541	267	640	328	493	291	263	244	218	243	236
1983	206	281	346	795	632	582	304	225	251	242	212	208
1984	221	274	336	271	312	274	281	313	249	227	263	323
1985	443	625	341	352	631	444	366	353	301	303	383	483
1986	535	534	697	666	792	647	354	360	294	235	258	318
1987	432	605	1284	1482	1000	501	527	467	409	390	417	577
1988	661	506	814	860	434	556	473	381	412	407	507	663
1989	641	517	481	681	974	509	280	254	256	297	400	498
1990	484	578	574	902	810	439	379	324	319	340	494	631
Average	478	518	679	791	675	497	373	349	323	309	363	444

Contra Costa Canal Intake, 247
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	205	275	882	1105	934	536	346	255	255	251	360	384
1977	414	415	463	639	884	647	387	359	416	397	518	714
1978	741	584	465	300	190	195	130	103	91	88	147	224
1979	350	483	1107	974	204	89	99	143	94	95	197	298
1980	368	385	544	264	268	176	105	137	106	86	120	209
1981	382	558	1368	1267	394	126	102	127	159	197	265	365
1982	440	461	130	253	106	162	81	79	83	77	118	116
1983	70	114	144	327	205	184	90	61	85	83	69	70
1984	78	108	133	85	93	82	92	118	94	94	143	216
1985	363	556	215	215	513	292	172	155	133	164	276	405
1986	446	436	625	560	326	249	120	131	113	93	136	210
1987	344	537	1369	1576	935	334	248	209	204	220	286	504
1988	571	361	774	797	273	280	209	184	229	241	401	613
1989	561	400	377	596	922	391	116	95	114	169	299	432
1990	407	504	494	873	742	300	206	156	162	206	402	581
Average	383	412	606	655	466	270	167	154	156	164	249	356

Contra Costa Canal Intake, 247
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2915	2956	3244	4853	4984	4890	4939	5102	5474	5320	4142	3437
1977	3700	3848	4148	5253	5250	5446	5437	4997	4663	4898	4980	4446
1978	4454	4145	5050	12513	10448	10135	7474	5002	3970	3626	3415	3323
1979	3390	3170	3289	6919	7257	5690	5105	5468	3827	3500	3483	3356
1980	3099	3040	3864	6174	12890	9694	6272	5764	4142	3750	3459	3421
1981	3293	3205	3329	5135	5122	4850	4888	4998	5094	5176	4160	3492
1982	3249	3473	4141	13472	6807	9408	6176	4708	3906	3638	3472	3169
1983	3201	5136	7156	16891	12687	10714	6444	4378	4912	4448	3665	3388
1984	3570	4914	7218	6298	6719	5583	4732	4742	3876	3526	3396	3279
1985	2973	3929	4165	4643	5086	5362	5657	5354	4513	4286	3998	3573
1986	3490	3402	4567	5619	12576	10936	6879	5515	4310	3716	3412	3236
1987	3170	3160	3285	4599	5522	5697	5964	5798	5621	5275	4884	4194
1988	4089	3775	3898	5447	5390	6661	6189	5185	5334	5285	4747	4020
1989	3953	3633	3784	5005	5286	4686	4222	4089	3989	3943	3924	3300
1990	3141	3183	3607	4650	4811	5044	5159	4587	4521	4379	4245	3741
Average	3446	3665	4316	7165	7389	6986	5702	5046	4543	4318	3959	3558

Clifton Court Forebay
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	283	277	250	284	466	492	533	489	457	399	371	405	4,706
1977	508	582	608	625	899	816	667	629	625	622	618	625	7,824
1978	679	694	564	416	360	258	244	278	280	272	248	295	4,588
1979	324	440	439	425	375	316	306	298	290	284	255	317	4,069
1980	425	445	332	233	180	177	273	303	291	265	251	296	3,471
1981	346	402	361	328	383	335	385	381	349	291	319	372	4,252
1982	465	502	305	326	219	176	177	211	260	267	250	268	3,426
1983	261	243	181	187	173	180	165	169	175	225	270	284	2,513
1984	278	209	170	178	256	304	301	276	281	256	233	284	3,026
1985	409	500	296	253	430	373	338	344	340	279	317	379	4,258
1986	470	510	404	399	195	161	249	287	308	325	270	298	3,876
1987	416	522	504	637	782	479	378	380	340	295	335	421	5,489
1988	491	485	391	417	431	331	361	400	428	338	362	524	4,959
1989	596	588	500	558	858	473	273	239	259	271	317	378	5,310
1990	453	561	582	812	980	551	393	373	348	299	353	493	6,198
76 - 90 AVG	427	464	392	405	466	361	336	337	335	313	318	376	4,531

Clifton Court Forebay
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	123	102	87	132	323	365	325	283	272	237	262	311	2,822
1977	362	418	438	524	848	759	515	418	395	399	416	521	6,013
1978	596	536	379	197	130	71	64	88	104	113	106	138	2,522
1979	162	293	304	243	150	107	106	112	120	122	121	193	2,033
1980	287	310	194	75	43	36	85	106	112	108	103	140	1,599
1981	187	244	216	147	152	122	149	152	152	166	212	271	2,170
1982	333	369	148	119	59	41	33	49	85	97	92	97	1,522
1983	90	76	42	48	40	43	33	33	35	62	92	101	695
1984	105	52	38	37	71	99	105	103	123	111	99	152	1,095
1985	277	373	143	102	292	209	147	151	161	153	210	277	2,495
1986	338	354	259	250	59	35	73	95	116	135	116	157	1,987
1987	275	388	390	562	701	329	195	180	165	169	228	331	3,913
1988	371	318	240	287	248	153	190	248	295	211	247	450	3,258
1989	505	426	348	457	706	326	112	92	129	150	207	281	3,739
1990	320	413	433	768	933	417	243	240	212	174	242	417	4,812
76 - 90 AVG	289	311	244	263	317	207	158	157	165	160	184	256	2,712

Clifton Court Forebay
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3021	3005	3278	4422	5169	4976	4702	4887	5041	4826	3955	3373	50,655
1977	3475	3648	3666	4361	4853	5036	5039	5222	5219	5537	5877	4928	56,861
1978	4430	4297	4149	6386	6866	5365	4586	3995	3784	3991	3928	3527	55,304
1979	3350	3100	3292	5011	6478	5728	4565	3806	3867	4183	3707	3389	50,476
1980	3206	2947	3301	4611	5795	4938	4756	3847	3777	3842	3712	3517	48,249
1981	3409	3251	3339	4661	6020	5756	4927	4857	4800	3695	3525	3306	51,546
1982	3289	3216	3724	5687	6047	4881	4381	3422	3890	3677	3494	3566	49,274
1983	3540	3495	3799	4415	5696	4939	4392	3304	4002	3797	3728	3809	48,916
1984	3803	3159	3686	4233	5574	5500	4219	3752	3982	3938	3616	3330	48,792
1985	3078	3261	3820	4272	4917	5347	4938	4740	4746	3668	3543	3330	49,660
1986	3344	3348	3675	4692	5794	4722	4607	3876	3960	4441	4165	3441	50,065
1987	3225	3175	3282	4064	5056	5539	5380	5466	4737	3776	3738	3477	50,915
1988	3440	3483	3511	4456	5331	5463	4765	4270	4119	4035	4182	3822	50,877
1989	3803	3692	3506	4288	5272	4878	3833	3486	3653	3562	3674	3321	46,968
1990	3203	3345	3560	4022	4801	5580	4526	3822	3926	3798	3980	3673	48,236
76 - 90 AVG	3,441	3,361	3,573	4,639	5,578	5,243	4,641	4,183	4,234	4,051	3,922	3,587	50,453

Clifton Court FB

Clifton Court Forebay
No-Action Alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	290	269	277	470	741	610	548	490	464	355	331	437	4,706
1,977	532	605	643	719	972	847	723	688	627	649	655	661	7,824
1,978	721	734	532	409	416	289	255	267	267	289	258	308	4,588
1,979	394	483	438	415	326	272	289	296	259	226	276	348	4,069
1,980	418	418	318	236	167	203	269	296	290	272	266	313	3,471
1,981	393	466	465	449	366	295	295	305	324	301	336	424	4,252
1,982	496	494	298	322	222	189	178	211	258	265	257	270	3,426
1,983	248	228	177	165	126	118	157	168	172	226	266	274	2,513
1,984	266	202	165	177	264	289	291	306	276	237	254	303	3,026
1,985	399	507	337	309	509	445	349	322	316	284	327	443	4,258
1,986	504	513	401	402	184	133	243	286	308	307	254	292	3,876
1,987	396	505	504	712	826	480	374	363	340	315	336	448	5,489
1,988	584	584	433	454	573	520	402	406	422	373	361	530	4,959
1,989	658	626	495	560	857	473	260	244	250	254	314	391	5,310
1,990	459	574	606	817	909	518	393	387	353	299	355	485	6,198
76 - 90 AVG	451	481	406	441	497	379	335	336	328	310	323	395	4,531

Clifton Court Forebay
No-Action Alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	138	110	124	357	652	487	353	294	265	210	218	332	2,822
1,977	405	473	477	628	941	798	540	446	416	428	443	536	6,013
1,978	616	568	359	206	180	115	64	75	92	115	109	171	2,522
1,979	235	340	307	267	140	91	87	103	104	91	152	226	2,033
1,980	282	283	172	162	47	52	63	98	108	109	109	164	1,599
1,981	243	323	342	301	172	109	104	118	147	169	228	315	2,170
1,982	362	362	142	165	81	49	33	44	70	86	94	109	1,522
1,983	91	90	47	47	40	43	33	33	34	55	76	90	695
1,984	95	90	39	36	57	81	91	109	115	99	120	166	1,095
1,985	263	389	187	158	387	285	170	170	184	161	215	334	2,495
1,986	365	354	257	256	201	37	58	65	109	123	105	148	1,987
1,987	257	376	389	648	755	326	182	163	162	170	212	338	3,913
1,988	462	417	298	332	329	259	205	225	253	227	237	448	3,258
1,989	567	479	360	464	750	328	105	91	108	129	204	286	3,739
1,990	328	429	469	773	862	386	248	267	231	179	248	399	4,812
76 - 90 AVG	314	339	265	320	373	230	156	155	161	157	185	271	2,712

Clifton Court Forebay
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1,976	3033	2936	3210	4287	5067	4973	4714	4843	4992	4360	3868	3473	50,655
1,977	3498	3607	3679	4403	4831	5018	5065	5276	5354	5719	6090	5249	56,861
1,978	4685	4464	4113	6323	7619	5859	4821	3812	3770	4174	3728	3490	55,304
1,979	3545	3202	3252	4852	6050	5162	4342	3803	3536	3411	3372	3228	50,476
1,980	3146	2940	3322	4615	5875	5331	4512	3750	3782	3947	3690	3498	48,249
1,981	3400	3222	3278	4333	5051	4800	4263	4313	4562	3931	3770	3438	51,546
1,982	3351	3220	3731	5644	6022	5016	4388	3477	3903	3689	3511	3574	49,274
1,983	3365	3397	3799	4393	5706	4861	4369	3275	4003	3796	3695	3731	48,916
1,984	3597	3088	3693	4229	5641	5144	4140	3835	3764	3522	3417	3251	48,792
1,985	3059	3260	3836	4281	4792	5471	4994	4078	3879	3669	3831	3583	49,660
1,986	3493	3404	3669	4670	5824	4734	4620	3875	3986	4331	3715	3263	50,065
1,987	3197	3182	3276	4000	4991	5541	5246	5173	4787	4262	4200	3999	50,915
1,988	3966	3838	3508	4451	5582	6127	5179	4811	4885	4546	4368	3945	50,877
1,989	3894	3629	3445	4254	5238	4908	3789	3699	3828	3526	3868	3350	46,968
1,990	3238	3317	3556	4029	4727	5441	4376	3610	3716	3654	3844	3647	48,236
76 - 90 AVG	3,498	3,382	3,558	4,584	5,534	5,226	4,588	4,109	4,183	4,036	3,918	3,648	50,453

Clifton Court Forebay
State Permit
Electrical Conductivity

Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	284	268	276	468	735	603	499	448	434	328	320	448	5,111
1977	543	651	673	708	896	831	690	640	601	627	635	654	8,149
1978	724	714	556	415	417	290	255	267	267	274	250	308	4,737
1979	395	486	443	410	326	272	290	296	257	224	275	350	4,024
1980	413	404	308	234	181	205	270	297	290	268	265	317	3,452
1981	387	434	415	432	359	301	299	302	325	317	338	421	4,330
1982	481	476	292	322	222	177	177	211	258	266	257	270	3,409
1983	248	228	177	186	172	178	163	169	173	226	266	274	2,460
1984	266	202	167	177	260	287	292	307	276	237	255	303	3,029
1985	398	494	330	294	473	429	341	323	310	278	327	447	4,444
1986	499	524	401	393	202	162	251	288	308	324	261	292	3,905
1987	395	504	501	705	817	476	361	349	335	313	336	448	5,540
1988	597	611	474	467	596	540	389	395	412	321	330	492	5,624
1989	607	606	501	561	850	478	264	250	255	259	322	424	5,377
1990	460	568	598	806	880	503	380	369	333	291	341	487	6,016
76 - 90 AVG	446	478	407	439	492	382	328	327	322	304	319	396	4,640

Clifton Court Forebay
State Permit
Bromide

Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	124	99	124	356	645	482	352	286	276	193	207	347	3,491
1977	407	515	522	597	841	777	543	447	414	425	441	536	6,465
1978	618	542	386	198	159	87	70	83	97	114	106	155	2,615
1979	241	344	304	237	126	86	99	111	106	89	151	230	2,124
1980	279	263	158	70	44	51	85	103	112	110	111	165	1,551
1981	245	288	283	273	167	111	109	118	149	170	224	311	2,448
1982	345	336	133	117	60	42	33	49	83	97	98	99	1,492
1983	82	69	41	48	40	43	33	33	34	63	90	95	671
1984	96	47	38	36	73	92	100	115	118	100	121	170	1,106
1985	269	367	176	142	340	269	163	158	164	152	215	340	2,755
1986	363	367	257	246	63	36	74	95	115	136	111	153	2,016
1987	251	366	386	640	742	321	176	156	160	170	214	342	3,924
1988	483	460	351	349	334	266	200	225	261	192	211	405	3,737
1989	504	456	357	465	753	338	109	94	109	133	210	322	3,850
1990	332	429	458	760	824	363	231	237	207	174	232	398	4,645
76 - 90 AVG	309	330	265	302	347	224	158	154	160	155	183	271	2,859

Clifton Court Forebay
State Permit
Dissolved Organic Carbon

Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3030	2936	3209	4282	5061	4976	4700	4720	4835	4144	3815	3511	49,219
1977	3462	3513	3632	4509	5008	5073	5079	5250	5299	5667	6030	5209	57,731
1978	4619	4271	4073	6316	7618	5856	4810	3805	3770	4099	3668	3487	56,402
1979	3489	3167	3281	4868	6051	5161	4344	3763	3525	3456	3399	3227	47,731
1980	3094	2917	3320	4613	5876	5330	4542	3758	3784	3903	3677	3501	48,315
1981	3299	3183	3284	4332	5044	5008	4392	4292	4568	4274	3947	3476	49,099
1982	3363	3222	3725	5644	6025	4887	4372	3476	3902	3893	3512	3572	49,393
1983	3362	3397	3803	4394	5706	4861	4369	3274	4003	3792	3696	3730	48,387
1984	3597	3089	3693	4229	5641	5148	4150	3839	3767	3523	3418	3251	47,345
1985	2991	3230	3833	4355	4870	5413	4904	4385	4096	3705	3873	3578	49,233
1986	3456	3386	3663	4669	5824	4734	4647	3892	3987	4412	3767	3265	49,702
1987	3195	3179	3275	4001	4992	5541	5244	5127	4752	4238	4165	3973	51,682
1988	3892	3723	3474	4439	5591	6141	5124	4692	4562	3994	4061	3854	53,547
1989	3816	3578	3441	4252	5144	4824	3789	3738	3931	3610	3792	3425	47,340
1990	3216	3267	3521	4030	4754	5497	4502	3811	3752	3554	3820	3661	47,385
76 - 90 AVG	3,459	3,337	3,548	4,596	5,547	5,231	4,598	4,121	4,169	4,004	3,909	3,648	50,167

Clifton Court Forebay
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	283	268	273	448	721	605	539	482	482	361	330	446	5,238
1977	542	609	644	719	960	826	666	615	597	634	644	659	8,115
1978	724	736	533	410	416	289	254	267	267	322	267	309	4,794
1979	393	481	434	420	329	272	289	296	259	226	277	348	4,024
1980	418	422	320	236	181	206	269	297	290	304	278	310	3,531
1981	398	500	495	488	395	306	301	310	326	300	334	416	4,571
1982	475	485	297	322	222	189	178	211	258	269	260	273	3,439
1983	248	228	179	186	172	178	163	169	173	226	266	274	2,462
1984	266	202	167	177	260	287	292	307	276	237	255	303	3,029
1985	400	524	323	288	511	445	350	323	311	286	339	454	4,554
1986	507	523	405	391	200	162	251	286	308	314	257	292	3,896
1987	394	502	501	705	817	476	456	467	385	329	340	439	5,811
1988	557	570	409	433	590	542	447	442	438	383	363	527	5,701
1989	655	631	501	559	853	471	260	244	249	254	315	391	5,383
1990	459	572	602	809	901	516	392	388	363	301	364	524	6,191
76 - 90 AVG	448	484	406	439	502	385	340	340	332	316	326	398	4,716

Clifton Court Forebay
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	123	99	121	332	627	483	353	292	285	208	217	345	3,485
1977	401	453	479	627	925	773	532	441	412	427	444	539	6,453
1978	620	565	354	192	158	86	70	83	97	138	116	156	2,635
1979	236	335	309	252	130	86	98	111	107	92	154	228	2,138
1980	282	283	173	72	44	52	84	103	112	129	118	158	1,610
1981	253	367	382	357	217	120	111	121	147	166	225	308	2,774
1982	340	349	139	117	60	48	33	49	83	99	101	102	1,520
1983	83	70	42	48	40	43	33	33	34	63	90	95	674
1984	96	47	38	38	73	92	99	115	118	99	121	170	1,104
1985	267	400	169	136	390	283	170	169	176	161	227	348	2,896
1986	369	360	261	243	61	36	74	95	115	131	108	153	2,006
1987	250	364	385	640	742	322	218	213	183	175	210	325	4,027
1988	437	397	263	306	324	263	217	229	247	227	236	444	3,590
1989	562	479	356	462	732	321	104	91	107	129	205	285	3,833
1990	327	427	454	762	855	385	246	265	230	178	258	442	4,829
76 - 90 AVG	310	333	262	305	359	226	163	161	164	161	189	273	2,905

Clifton Court Forebay
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3030	2936	3214	4321	5106	4978	4723	4856	4958	4340	3874	3498	49,834
1977	3511	3611	3685	4418	4846	5008	5055	5233	5296	5673	6045	5234	57,615
1978	4686	4486	4113	6324	7616	5859	4810	3805	3776	4210	3759	3490	56,934
1979	3546	3202	3236	4853	6063	5159	4331	3797	3539	3411	3371	3228	47,736
1980	3151	2944	3323	4615	5876	5333	4514	3748	3784	4106	3757	3490	48,641
1981	3365	3192	3270	4243	4965	4870	4324	4362	4638	3947	3771	3425	48,372
1982	3324	3206	3730	5645	6022	5016	4388	3477	3908	3735	3536	3579	49,566
1983	3367	3399	3842	4401	5706	4861	4369	3274	4004	3792	3696	3731	48,442
1984	3597	3069	3693	4229	5641	5145	4144	3835	3765	3523	3418	3251	47,330
1985	3071	3267	3864	4161	4767	5476	5001	4106	3912	3701	3887	3602	48,815
1986	3501	3423	3675	4657	5821	4734	4619	3870	3990	4350	3728	3264	49,632
1987	3196	3181	3276	4001	4992	5543	5203	5333	5023	4465	4368	4142	52,723
1988	4067	3996	3546	4454	5596	6155	5235	4965	5036	4668	4439	3982	56,139
1989	3914	3664	3459	4259	5261	4917	3791	3700	3830	3527	3668	3350	47,340
1990	3243	3328	3565	4032	4709	5415	4373	3667	3848	3755	3922	3698	47,555
76 - 90 AVG	3,505	3,395	3,566	4,574	5,532	5,231	4,592	4,135	4,220	4,080	3,949	3,664	50,445

Clifton Court FB

Clifton Court Forebay
Flow Study
Electrical Conductivity

Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	296	270	277	466	733	601	570	518	505	375	336	456	5,403
1977	526	562	548	543	845	780	706	697	628	646	651	658	7,790
1978	720	738	556	414	409	286	254	267	267	322	267	311	4,811
1979	396	484	435	420	329	270	287	295	256	239	274	346	4,031
1980	421	428	321	236	181	206	266	296	290	310	274	311	3,540
1981	400	505	497	492	394	312	301	309	332	323	328	397	4,590
1982	470	477	293	322	222	188	178	211	258	271	260	273	3,423
1983	248	228	181	189	172	178	163	169	173	226	266	274	2,467
1984	266	202	167	177	260	287	292	307	276	238	255	302	3,029
1985	398	519	323	285	505	445	356	331	311	307	333	434	4,547
1986	494	479	380	399	203	162	251	287	308	344	264	293	3,864
1987	397	505	501	705	817	477	485	571	459	357	347	440	6,061
1988	570	560	445	465	603	561	440	434	449	348	338	512	5,725
1989	631	605	495	558	846	478	264	236	251	287	321	409	5,381
1990	456	567	594	796	888	508	456	369	350	293	328	454	6,059
76 - 90 AVG	446	475	401	431	494	383	351	353	341	326	323	391	4,715

Clifton Court Forebay
Flow Study
Bromide

Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	138	102	125	354	643	490	354	300	292	214	222	356	3,590
1977	379	381	377	434	787	718	504	434	407	421	438	515	5,795
1978	605	561	377	197	155	85	70	83	97	138	116	158	2,642
1979	241	340	311	252	130	86	98	111	106	97	149	225	2,146
1980	285	290	174	72	44	52	83	103	112	131	115	158	1,619
1981	257	374	384	362	224	124	111	121	149	174	209	283	2,772
1982	332	337	134	117	60	48	33	49	83	99	100	102	1,494
1983	83	70	43	49	40	43	33	33	34	63	90	95	676
1984	96	47	38	36	73	92	99	115	118	100	121	169	1,104
1985	266	395	168	134	381	283	172	169	166	163	214	325	2,836
1986	358	316	233	253	64	36	74	95	115	146	112	153	1,955
1987	254	367	386	640	742	320	230	282	218	187	211	329	4,146
1988	454	406	316	346	339	279	206	211	247	199	217	428	3,648
1989	533	454	352	461	750	339	110	89	113	150	202	302	3,855
1990	325	425	453	749	829	370	251	204	201	168	218	359	4,552
76 - 90 AVG	307	324	258	297	351	224	162	159	164	163	182	264	2,855

Clifton Court Forebay
Flow Study
Dissolved Organic Carbon

Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3036	2937	3210	4287	5069	4995	4734	4952	5082	4408	3914	3511	50,135
1977	3555	3759	3676	4328	4836	5004	5032	5277	5382	5737	6095	5540	58,221
1978	4951	4519	4149	6335	7542	5816	4808	3804	3777	4212	3759	3490	57,162
1979	3512	3182	3235	4853	6064	5145	4305	3789	3536	3481	3417	3228	47,747
1980	3165	2951	3322	4615	5876	5333	4525	3761	3785	4013	3725	3486	48,557
1981	3346	3180	3267	4241	4940	4851	4312	4350	4700	4330	3987	3456	48,960
1982	3359	3221	3728	5644	6022	5008	4387	3476	3908	3752	3544	3579	49,628
1983	3370	3401	3872	4412	5707	4861	4369	3274	4003	3792	3696	3730	48,487
1984	3599	3089	3693	4229	5641	5144	4142	3834	3765	3524	3418	3251	47,329
1985	3053	3259	3865	4183	4789	5491	4988	4222	4040	3885	4010	3563	49,348
1986	3472	3346	3649	4676	5825	4733	4622	3868	3986	4369	3765	3266	49,577
1987	3195	3179	3275	4001	4992	5532	5180	5236	5063	4678	4462	4016	52,809
1988	3956	3847	3477	4439	5597	6285	5746	5363	5052	4317	4174	3850	56,103
1989	3813	3584	3443	4257	5142	4824	3791	3592	3799	3815	4032	3477	47,569
1990	3240	3294	3530	4021	4762	5492	4694	4074	3922	3715	3800	3599	48,143
76 - 90 AVG	3,508	3,383	3,559	4,568	5,520	5,234	4,642	4,191	4,253	4,135	3,987	3,869	50,652

Clifton Court Forebay
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	331	297	298	567	827	615	585	544	533	420	391	532	5,940
1977	573	552	538	531	809	795	669	614	604	632	639	653	7,609
1978	720	728	543	413	417	290	255	267	268	322	284	309	4,816
1979	397	483	438	406	326	270	287	301	285	241	270	336	4,040
1980	426	448	338	237	181	206	271	299	291	314	291	312	3,614
1981	387	446	454	473	411	325	292	324	418	426	352	430	4,738
1982	488	480	293	323	222	182	177	210	259	273	268	276	3,451
1983	249	228	192	191	172	178	163	169	173	226	263	273	2,477
1984	263	202	167	177	260	287	292	307	276	237	256	302	3,026
1985	405	556	335	294	521	451	389	455	486	356	335	455	5,038
1986	518	520	396	403	203	162	252	287	308	348	269	292	3,958
1987	397	505	501	704	816	481	438	618	631	577	475	480	6,623
1988	576	602	405	419	600	619	461	420	453	414	373	533	5,875
1989	660	591	481	547	848	471	262	363	384	304	319	420	5,650
1990	459	567	596	798	886	514	477	410	366	304	372	539	6,288
76 - 90 AVG	457	480	398	432	500	390	351	373	382	360	344	409	4,876

Clifton Court Forebay
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	180	133	151	471	763	499	357	311	300	236	267	441	4,109
1977	432	367	351	402	733	727	541	444	410	418	433	529	5,787
1978	613	554	367	196	159	87	70	83	97	138	122	154	2,640
1979	240	333	287	231	126	85	98	113	120	98	135	208	2,074
1980	285	313	194	74	44	52	85	104	112	135	124	158	1,680
1981	234	294	328	330	228	132	107	128	187	220	218	319	2,725
1982	354	341	134	117	60	45	33	48	83	101	105	106	1,527
1983	83	70	51	51	40	43	33	33	34	63	88	95	684
1984	94	47	38	36	73	92	99	115	118	100	122	168	1,102
1985	268	437	183	144	401	289	185	213	235	183	209	347	3,094
1986	378	343	246	256	64	36	74	95	115	148	115	153	2,023
1987	253	367	386	639	741	318	213	288	300	289	264	336	4,394
1988	444	444	241	288	329	305	214	205	241	238	238	446	3,633
1989	563	433	330	446	696	320	106	151	174	153	198	316	3,886
1990	329	427	455	751	828	362	257	215	200	173	266	460	4,723
76 - 90 AVG	317	327	249	295	352	226	165	170	182	180	194	282	2,939

Clifton Court Forebay
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	3058	2952	3211	4177	4878	5014	4814	5065	5011	4591	4287	3681	50,739
1977	3634	3778	3724	4433	4916	5140	5308	5392	5412	5749	6102	5255	58,843
1978	4673	4400	4102	6336	7643	5869	4810	3806	3782	4221	3840	3517	56,999
1979	3548	3251	3328	4880	6054	5144	4307	3831	3631	3582	3520	3343	48,419
1980	3248	2966	3326	4616	5875	5332	4540	3756	3797	4189	3835	3510	48,989
1981	3450	3294	3303	4307	5066	4907	4286	4299	4845	4637	4234	3557	50,185
1982	3376	3225	3731	5650	6025	4932	4378	3412	3916	3838	3632	3601	49,716
1983	3374	3404	4052	4447	5707	4860	4369	3274	4003	3783	3643	3713	48,629
1984	3542	3090	3693	4229	5641	5146	4145	3835	3765	3523	3418	3251	47,278
1985	3153	3309	3871	4168	4772	5511	5036	4426	4566	4404	4197	3667	51,080
1986	3597	3544	3704	4688	5825	4734	4633	3882	3987	4428	3796	3267	50,085
1987	3196	3178	3274	4001	4993	5513	5271	5137	5076	5240	5031	4624	54,534
1988	4448	4617	3697	4474	5812	6407	5985	5325	5282	4856	4658	4136	59,497
1989	3977	3640	3455	4271	5289	4914	3797	3916	4480	4308	4092	3485	49,624
1990	3233	3289	3532	4025	4760	5453	4809	4431	4218	3873	3983	3709	49,315
76 - 90 AVG	3,567	3,462	3,600	4,580	5,537	5,258	4,699	4,252	4,385	4,348	4,151	3,754	51,595

Clifton Court Forebay
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	329	362	705	904	849	586	551	521	513	545	406	397
1977	493	517	574	638	806	758	598	518	509	491	504	575
1978	684	689	536	411	383	282	224	248	289	244	249	317
1979	412	498	813	780	334	270	314	379	289	221	283	350
1980	422	437	513	324	193	202	286	311	318	266	239	313
1981	413	524	967	1031	505	313	328	408	466	535	394	390
1982	477	499	296	324	251	176	175	211	261	237	241	281
1983	234	231	188	182	170	177	169	172	179	243	265	269
1984	239	201	166	168	233	285	324	374	303	235	251	304
1985	402	534	359	322	513	426	403	462	384	331	331	406
1986	490	511	572	573	282	168	248	289	317	254	248	304
1987	397	514	974	1245	855	469	394	517	530	524	419	437
1988	535	548	656	720	451	457	575	449	457	508	442	529
1989	593	534	453	518	818	478	274	303	295	282	318	416
1990	454	520	522	705	748	469	508	470	381	330	377	498
Average	438	475	553	590	493	368	358	375	366	350	331	386

Clifton Court Forebay
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	183	213	646	879	799	485	314	271	268	288	275	290
1977	336	326	362	468	680	643	454	346	349	349	359	478
1978	584	523	375	196	142	83	53	67	104	95	117	178
1979	261	357	770	685	143	86	107	140	112	88	150	225
1980	284	301	407	166	51	48	90	103	120	105	102	167
1981	273	395	955	1020	357	139	125	165	202	252	225	272
1982	340	369	143	118	72	41	33	48	84	86	103	122
1983	74	71	52	46	39	42	33	34	35	74	93	94
1984	75	47	37	35	60	91	115	144	121	93	118	171
1985	269	419	213	174	388	271	189	202	171	162	201	297
1986	350	355	463	462	109	38	69	90	116	98	113	169
1987	259	383	962	1295	791	318	194	236	247	263	240	311
1988	412	410	559	650	296	244	268	201	220	261	280	439
1989	475	364	303	414	724	344	119	123	129	143	199	314
1990	322	384	388	644	665	307	256	223	184	176	284	414
Average	300	328	442	483	354	212	161	160	164	169	189	263

Clifton Court Forebay
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2981	2865	3125	4078	4732	4772	4576	4852	5006	5453	4302	3424
1977	3620	3836	3921	4673	5248	5480	5342	5211	4969	4941	5347	4775
1978	4407	4173	4014	6321	7172	5735	4499	3487	3798	3657	3404	3317
1979	3388	3175	3143	4859	6088	5146	4566	3980	3761	3427	3498	3357
1980	3166	2976	3291	4658	5967	5229	4855	3693	3968	3809	3466	3427
1981	3291	3157	3190	4182	5034	4855	4580	4400	4563	5110	4291	3485
1982	3322	3198	3719	5689	5999	4829	4396	3337	3878	3692	3504	3436
1983	3484	3502	4065	4349	5706	4862	4388	3318	4005	3858	3652	3668
1984	3692	3220	3710	4227	5638	5212	4415	4151	3916	3496	3387	3236
1985	3041	3267	3826	4296	4755	5309	5298	4695	4476	4306	4125	3565
1986	3475	3374	3621	4720	6360	4790	4459	3586	4032	3733	3400	3246
1987	3152	3133	3172	3958	4971	5441	5226	5196	5169	5445	5206	4619
1988	4424	4544	3537	4509	5445	5984	5872	5471	5215	5470	5069	3996
1989	3811	3600	3450	4255	5101	4780	3983	4007	4036	3916	4063	3499
1990	3167	3175	3406	3976	4682	5209	4826	4789	4461	4339	4226	3720
Average	3495	3413	3546	4583	5527	5176	4752	4278	4350	4310	4063	3651

Greens Landing
Existing Conditions
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	150	150	153	151	151	151	151	151	151	151	151	1,811
1977	151	151	150	153	151	151	151	151	151	151	151	151	1,813
1978	151	151	155	155	152	152	150	151	151	151	150	151	1,820
1979	151	151	150	158	153	151	151	151	151	150	150	151	1,818
1980	150	150	152	152	152	150	151	151	151	151	151	151	1,812
1981	151	151	151	153	151	151	151	151	151	151	151	151	1,814
1982	151	151	151	153	150	152	150	150	150	150	150	150	1,808
1983	150	152	151	153	152	152	150	150	150	150	150	150	1,810
1984	150	151	151	151	151	150	151	151	151	150	150	151	1,808
1985	150	152	150	152	152	152	151	151	151	151	151	151	1,814
1986	151	152	152	154	153	151	151	151	151	151	150	151	1,818
1987	151	151	150	152	152	151	151	151	151	151	151	151	1,813
1988	151	151	152	153	152	151	151	151	151	151	151	151	1,816
1989	151	151	151	152	152	151	151	151	151	151	151	150	1,813
1990	150	150	151	153	152	151	151	150	151	151	151	151	1,812
76 - 90 AVG	151	151	151	153	152	151	151	151	151	151	151	151	1,813

Greens Landing
Existing Conditions
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	30	30	30	31	31	31	31	31	31	31	30	31	368
1977	31	30	30	31	31	31	31	31	31	31	31	31	370
1978	31	31	33	32	31	31	30	30	31	30	30	31	371
1979	31	30	30	34	32	30	30	31	31	30	30	30	369
1980	30	30	31	31	31	30	30	31	31	30	30	31	366
1981	31	30	30	31	30	30	31	31	31	31	31	31	368
1982	31	31	30	31	30	31	30	30	30	30	30	30	364
1983	30	31	30	31	31	31	30	30	30	30	30	30	364
1984	30	31	31	30	30	30	30	31	31	30	30	31	365
1985	30	32	30	31	31	31	31	31	31	30	31	31	370
1986	31	32	31	32	31	30	30	31	31	31	30	30	370
1987	31	30	30	31	31	31	31	31	31	31	31	31	370
1988	31	31	31	31	31	31	31	31	31	31	31	31	372
1989	31	31	30	31	31	30	30	31	31	30	30	30	366
1990	30	30	30	31	31	31	31	30	31	31	31	31	368
76 - 90 AVG	31	31	30	31	31	31	30	31	31	30	30	31	368

Greens Landing
Existing Conditions
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2110	2301	2790	2639	3574	2548	2030	2400	2139	2503	2422	2318	29,774
1977	2130	2296	2777	2645	3576	2551	2045	2394	2153	2508	2441	2329	29,845
1978	2143	2296	2823	2657	3600	2531	2012	2402	2127	2508	2416	2318	29,833
1979	2124	2298	2786	2687	3608	2525	2018	2401	2124	2505	2416	2315	29,807
1980	2117	2297	2810	2628	3606	2518	2015	2400	2133	2507	2418	2319	29,768
1981	2122	2300	2791	2637	3590	2532	2021	2399	2134	2506	2422	2317	29,771
1982	2119	2311	2802	2631	3594	2532	2012	2402	2119	2504	2415	2311	29,752
1983	2110	2323	2800	2631	3604	2531	2010	2399	2110	2506	2413	2309	29,746
1984	2112	2304	2811	2610	3592	2522	2017	2398	2127	2503	2415	2316	29,727
1985	2116	2325	2800	2625	3582	2556	2031	2399	2131	2506	2425	2319	29,815
1986	2124	2317	2808	2652	3601	2519	2020	2400	2135	2506	2417	2316	29,815
1987	2121	2299	2785	2632	3589	2539	2023	2401	2131	2506	2428	2326	29,780
1988	2126	2301	2804	2645	3592	2557	2037	2396	2140	2505	2430	2324	29,857
1989	2128	2299	2786	2637	3572	2539	2014	2400	2128	2505	2421	2313	29,742
1990	2118	2297	2782	2639	3592	2549	2027	2397	2133	2507	2424	2323	29,788
76 - 90 AVG	2122	2304	2796	2640	3590	2538	2022	2399	2131	2506	2422	2318	29,788

Greens Landing
No-Action alternative
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	150	150	152	151	151	151	151	151	151	151	151	1,810
1977	151	151	150	154	152	151	151	151	151	151	151	151	1,815
1978	151	151	155	155	152	152	150	150	151	151	150	151	1,819
1979	151	150	150	158	153	151	151	151	151	151	150	151	1,818
1980	150	150	152	152	152	150	151	151	151	151	151	151	1,812
1981	151	151	151	154	151	151	151	151	151	151	151	151	1,815
1982	150	151	151	153	150	152	150	150	150	150	150	150	1,807
1983	150	152	151	153	152	152	150	150	150	150	150	150	1,810
1984	150	151	151	151	151	150	151	151	151	150	150	151	1,808
1985	150	153	151	152	152	151	151	151	151	151	151	151	1,815
1986	151	152	152	154	153	151	151	151	151	151	150	151	1,818
1987	151	150	150	152	152	151	151	151	151	151	151	151	1,812
1988	151	151	152	153	151	152	151	151	151	151	151	151	1,816
1989	151	151	151	152	152	151	151	151	151	151	151	150	1,813
1990	150	150	150	152	152	151	151	151	151	151	151	151	1,811
76 - 90 AVG	151	151	151	153	152	151	151	151	151	151	151	151	1,813

Greens Landing
No-Action alternative
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	30	30	30	31	30	30	31	31	31	31	31	31	367
1977	31	30	30	31	31	31	31	31	31	31	31	31	370
1978	31	31	33	32	31	31	30	30	31	30	30	31	371
1979	31	30	30	33	32	30	30	31	31	30	30	30	368
1980	30	30	31	31	31	30	30	31	31	31	30	31	367
1981	31	30	30	32	30	30	31	31	31	31	31	31	369
1982	30	31	30	31	30	31	30	30	30	30	30	30	363
1983	30	31	30	31	31	31	30	30	30	30	30	30	364
1984	30	31	31	30	30	30	30	31	31	30	30	31	365
1985	30	32	30	31	31	31	31	31	31	31	31	31	371
1986	31	32	31	31	31	30	30	31	31	31	30	30	369
1987	31	30	30	31	31	31	31	31	31	31	31	31	370
1988	31	31	31	31	31	31	31	31	31	31	31	31	372
1989	31	31	30	31	31	30	30	31	31	31	31	30	368
1990	30	30	30	31	31	31	31	31	31	31	31	31	369
76 - 90 AVG	31	31	30	31	31	31	30	31	31	31	31	31	368

Greens Landing
No-Action Alternative
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2110	2301	2790	2635	3579	2542	2028	2400	2136	2508	2425	2319	29,773
1977	2130	2296	2778	2651	3574	2555	2037	2395	2148	2508	2437	2329	29,836
1978	2133	2296	2821	2659	3601	2532	2012	2402	2127	2508	2416	2319	29,826
1979	2122	2299	2787	2685	3608	2525	2017	2403	2126	2506	2417	2315	29,809
1980	2115	2297	2810	2628	3606	2518	2014	2399	2131	2505	2418	2319	29,760
1981	2120	2300	2791	2644	3587	2531	2019	2400	2145	2506	2425	2318	29,786
1982	2116	2312	2802	2631	3594	2532	2012	2402	2120	2504	2416	2311	29,752
1983	2111	2324	2800	2632	3604	2531	2010	2399	2110	2506	2413	2309	29,749
1984	2112	2304	2811	2610	3592	2521	2017	2400	2128	2503	2415	2316	29,729
1985	2116	2328	2800	2625	3583	2549	2031	2397	2137	2507	2425	2319	29,817
1986	2122	2315	2807	2651	3602	2519	2019	2400	2135	2506	2417	2316	29,809
1987	2119	2299	2786	2632	3590	2538	2025	2399	2146	2508	2431	2327	29,800
1988	2127	2301	2803	2642	3591	2577	2041	2394	2140	2506	2429	2322	29,873
1989	2125	2300	2787	2636	3573	2538	2013	2401	2135	2505	2424	2314	29,751
1990	2115	2298	2784	2635	3593	2547	2031	2396	2138	2506	2424	2321	29,788
76 - 90 AVG	2120	2304	2796	2640	3590	2538	2022	2399	2133	2506	2423	2318	29,791

Greens Landing
State Permit
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	150	150	152	151	151	151	151	151	151	151	151	1,810
1977	151	151	150	154	151	151	151	151	151	151	151	151	1,814
1978	151	151	155	155	152	152	150	150	151	150	150	151	1,818
1979	151	150	150	158	154	151	151	151	151	150	151	151	1,819
1980	150	150	152	152	152	150	151	151	151	151	150	151	1,811
1981	151	151	151	154	151	151	151	151	151	151	151	151	1,815
1982	150	151	151	153	150	152	150	150	150	150	150	150	1,807
1983	150	152	151	153	152	152	150	150	150	150	150	150	1,810
1984	150	151	151	151	151	150	151	151	151	150	150	151	1,808
1985	150	153	151	152	152	152	151	151	151	151	151	151	1,816
1986	151	152	152	154	153	151	151	151	151	150	150	151	1,817
1987	151	151	150	152	152	151	151	151	151	151	151	151	1,813
1988	151	151	152	153	151	151	151	151	151	151	151	151	1,815
1989	151	151	151	152	152	151	151	151	151	151	151	150	1,813
1990	150	150	150	152	152	151	151	151	151	151	151	151	1,811
76 - 90 AVG	151	151	151	153	152	151	151	151	151	151	151	151	1,813

Greens Landing
State Permit
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	30	30	30	31	31	30	31	31	31	31	30	31	367
1977	31	30	30	32	31	31	31	31	31	31	31	31	371
1978	31	31	33	32	31	31	30	30	31	30	30	31	371
1979	31	30	30	34	32	30	30	31	31	30	30	31	370
1980	30	30	31	31	31	30	30	31	31	30	30	31	366
1981	31	30	30	32	30	30	31	31	31	31	31	31	369
1982	30	31	30	31	30	31	30	30	30	30	30	30	363
1983	30	31	30	31	31	31	30	30	30	30	30	30	364
1984	30	31	31	30	30	30	30	31	31	30	30	31	365
1985	30	32	30	31	31	31	31	31	31	31	31	31	371
1986	31	32	31	31	31	30	30	31	31	30	30	30	368
1987	31	30	30	31	31	31	31	31	31	31	31	31	370
1988	31	31	31	31	31	31	31	31	31	31	31	31	372
1989	31	31	30	31	31	30	30	31	31	31	31	30	368
1990	30	30	30	31	31	31	31	31	31	31	31	31	369
76 - 90 AVG	31	31	30	31	31	31	30	31	31	31	30	31	368

Greens Landing
State Permit
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2110	2301	2790	2633	3580	2544	2027	2400	2143	2510	2419	2319	29,776
1977	2131	2296	2774	2654	3575	2549	2041	2395	2140	2508	2436	2328	29,827
1978	2136	2296	2822	2659	3601	2532	2012	2402	2127	2503	2415	2317	29,822
1979	2122	2299	2787	2685	3612	2527	2017	2403	2124	2505	2419	2317	29,817
1980	2114	2297	2810	2628	3606	2518	2014	2400	2131	2505	2416	2319	29,758
1981	2120	2300	2792	2647	3586	2534	2020	2400	2146	2511	2425	2318	29,799
1982	2116	2312	2802	2631	3594	2532	2012	2402	2120	2504	2416	2311	29,752
1983	2111	2324	2800	2632	3604	2531	2010	2399	2110	2506	2413	2309	29,749
1984	2112	2304	2811	2610	3592	2521	2017	2400	2127	2503	2415	2316	29,728
1985	2116	2328	2800	2624	3583	2552	2032	2397	2136	2507	2424	2319	29,818
1986	2124	2315	2807	2651	3602	2519	2019	2400	2135	2501	2415	2316	29,804
1987	2119	2299	2786	2632	3590	2539	2026	2397	2146	2508	2433	2327	29,802
1988	2127	2301	2803	2643	3591	2560	2043	2396	2143	2509	2430	2322	29,868
1989	2126	2300	2786	2637	3573	2538	2014	2401	2132	2505	2427	2314	29,753
1990	2115	2298	2784	2636	3593	2545	2032	2393	2137	2507	2422	2321	29,783
76 - 90 AVG	2120	2304	2796	2640	3590	2537	2022	2399	2133	2506	2422	2318	29,790

Greens Landing
Percent Inflow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	150	150	152	151	151	151	151	151	151	151	151	1,810
1977	151	151	150	154	151	151	151	151	151	151	151	151	1,814
1978	151	151	155	155	152	152	150	150	151	150	150	151	1,818
1979	151	150	150	158	154	151	151	151	151	150	151	151	1,819
1980	150	150	152	152	152	150	151	151	151	151	150	151	1,811
1981	151	151	151	154	151	151	151	151	151	151	151	151	1,815
1982	150	151	151	153	150	152	150	150	150	150	150	150	1,807
1983	150	152	151	153	152	152	150	150	150	150	150	150	1,810
1984	150	151	151	151	151	150	151	151	151	150	150	151	1,808
1985	150	153	151	152	152	152	151	151	151	151	151	151	1,816
1986	151	152	152	154	153	151	151	151	151	150	150	151	1,817
1987	151	151	150	152	152	151	151	151	151	151	151	151	1,813
1988	151	151	152	153	151	151	151	151	151	151	151	151	1,815
1989	151	151	151	152	152	151	151	151	151	151	151	150	1,813
1990	150	150	150	152	152	151	151	151	151	151	151	151	1,811
76 - 90 AVG	151	151	151	153	152	151	151	151	151	151	151	151	1,813

Greens Landing
Percent Inflow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	30	30	30	31	31	30	31	31	31	31	30	31	367
1977	31	30	30	32	31	31	31	31	31	31	31	31	371
1978	31	31	33	32	31	31	30	30	31	30	30	31	371
1979	31	30	30	34	32	30	30	31	31	30	30	31	370
1980	30	30	31	31	31	30	30	31	31	30	30	31	366
1981	31	30	30	32	30	30	31	31	31	31	31	31	369
1982	30	31	30	31	30	31	30	30	30	30	30	30	363
1983	30	31	30	31	31	31	30	30	30	30	30	30	364
1984	30	31	31	30	30	30	30	31	31	30	30	31	365
1985	30	32	30	31	31	31	31	31	31	31	31	31	371
1986	31	32	31	31	31	30	30	31	31	30	30	30	368
1987	31	30	30	31	31	31	31	31	31	31	31	31	370
1988	31	31	31	31	31	31	31	31	31	31	31	31	372
1989	31	31	30	31	31	30	30	31	31	31	31	30	368
1990	30	30	30	31	31	31	31	31	31	31	31	31	369
76 - 90 AVG	31	31	30	31	31	31	30	31	31	31	30	31	368

Greens Landing
Percent Inflow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2110	2301	2790	2633	3580	2544	2027	2400	2143	2510	2419	2319	29,776
1977	2131	2296	2774	2654	3575	2549	2041	2395	2140	2508	2436	2328	29,827
1978	2136	2296	2822	2659	3601	2532	2012	2402	2127	2503	2415	2317	29,822
1979	2122	2299	2787	2685	3612	2527	2017	2403	2124	2505	2419	2317	29,817
1980	2114	2297	2810	2628	3606	2518	2014	2400	2131	2505	2416	2319	29,758
1981	2120	2300	2792	2647	3586	2534	2020	2400	2146	2511	2425	2318	29,799
1982	2116	2312	2802	2631	3594	2532	2012	2402	2120	2504	2416	2311	29,752
1983	2111	2324	2800	2632	3604	2531	2010	2399	2110	2506	2413	2309	29,749
1984	2112	2304	2811	2610	3592	2521	2017	2400	2127	2503	2415	2316	29,728
1985	2116	2328	2800	2624	3583	2552	2032	2397	2136	2507	2424	2319	29,818
1986	2124	2315	2807	2651	3602	2519	2019	2400	2135	2501	2415	2316	29,804
1987	2119	2299	2786	2632	3590	2539	2026	2397	2148	2508	2433	2327	29,802
1988	2127	2301	2803	2643	3591	2560	2043	2396	2143	2509	2430	2322	29,868
1989	2126	2300	2786	2637	3573	2538	2014	2401	2132	2505	2427	2314	29,753
1990	2115	2298	2784	2636	3593	2545	2032	2393	2137	2507	2422	2321	29,783
76 - 90 AVG	2120	2304	2796	2640	3590	2537	2022	2399	2133	2506	2422	2318	29,790

Greens Landing
Flow Study
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	150	150	152	151	151	151	151	151	151	151	151	1,810
1977	151	151	150	154	151	151	151	151	151	151	151	151	1,814
1978	151	151	155	155	152	152	150	150	151	150	150	151	1,818
1979	151	150	150	158	154	151	151	151	151	150	151	151	1,819
1980	150	150	152	152	152	150	151	151	151	151	150	151	1,811
1981	151	151	151	154	151	151	151	151	151	151	151	151	1,815
1982	150	151	151	153	150	152	150	150	150	150	150	150	1,807
1983	150	152	151	153	152	152	150	150	150	150	150	150	1,810
1984	150	151	151	151	151	150	151	151	151	150	150	151	1,808
1985	150	153	151	152	152	152	151	151	151	151	151	151	1,816
1986	151	152	152	154	153	151	151	151	151	150	150	151	1,817
1987	151	151	150	152	152	151	151	151	151	151	151	151	1,813
1988	151	151	152	153	151	151	151	151	151	151	151	151	1,815
1989	151	151	151	152	152	151	151	151	151	151	151	150	1,813
1990	150	150	150	152	152	151	151	151	151	151	151	151	1,811
76 - 90 AVG	151	151	151	153	152	151	151	151	151	151	151	151	1,813

Greens Landing
Flow Study
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	30	30	30	31	31	30	31	31	31	31	30	31	367
1977	31	30	30	32	31	31	31	31	31	31	31	31	371
1978	31	31	33	32	31	31	30	30	31	30	30	31	371
1979	31	30	30	34	32	30	30	31	31	30	30	31	370
1980	30	30	31	31	31	30	30	31	31	30	30	31	366
1981	31	30	30	32	30	30	31	31	31	31	31	31	369
1982	30	31	30	31	30	31	30	30	30	30	30	30	363
1983	30	31	30	31	31	31	30	30	30	30	30	30	364
1984	30	31	31	30	30	30	30	31	31	30	30	31	365
1985	30	32	30	31	31	31	31	31	31	31	31	31	371
1986	31	32	31	31	31	30	30	31	31	30	30	30	368
1987	31	30	30	31	31	31	31	31	31	31	31	31	370
1988	31	31	31	31	31	31	31	31	31	31	31	31	372
1989	31	31	30	31	31	30	30	31	31	31	31	30	368
1990	30	30	30	31	31	31	31	31	31	31	31	31	369
76 - 90 AVG	31	31	30	31	31	31	30	31	31	31	30	31	368

Greens Landing
Flow Study
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2110	2301	2790	2633	3580	2544	2027	2400	2143	2510	2419	2319	29,776
1977	2131	2296	2774	2654	3575	2549	2041	2395	2140	2508	2436	2328	29,827
1978	2136	2296	2822	2659	3601	2532	2012	2402	2127	2503	2415	2317	29,822
1979	2122	2299	2787	2685	3612	2527	2017	2403	2124	2505	2419	2317	29,817
1980	2114	2297	2810	2628	3606	2518	2014	2400	2131	2505	2416	2319	29,758
1981	2120	2300	2792	2647	3586	2534	2020	2400	2146	2511	2425	2318	29,799
1982	2116	2312	2802	2631	3594	2532	2012	2402	2120	2504	2416	2311	29,752
1983	2111	2324	2800	2632	3604	2531	2010	2399	2110	2506	2413	2309	29,749
1984	2112	2304	2811	2610	3592	2521	2017	2400	2127	2503	2415	2316	29,728
1985	2118	2328	2800	2624	3583	2552	2032	2397	2136	2507	2424	2319	29,818
1986	2124	2315	2807	2651	3602	2519	2019	2400	2135	2501	2415	2316	29,804
1987	2119	2299	2786	2632	3590	2539	2026	2397	2148	2508	2433	2327	29,802
1988	2127	2301	2803	2643	3591	2560	2043	2396	2143	2509	2430	2322	29,868
1989	2126	2300	2786	2637	3573	2538	2014	2401	2132	2505	2427	2314	29,753
1990	2115	2298	2784	2636	3593	2545	2032	2393	2137	2507	2422	2321	29,783
76 - 90 AVG	2120	2304	2796	2640	3590	2537	2022	2399	2133	2506	2422	2318	29,790

Greens Landing
Maximum Flow
Electrical Conductivity
Units are in microsiemens/centimeter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	150	150	150	152	151	151	151	151	151	151	151	151	1,810
1977	151	151	150	154	151	151	151	151	151	151	151	151	1,814
1978	151	151	155	155	152	152	150	150	151	150	150	151	1,818
1979	151	150	150	158	154	151	151	151	151	150	151	151	1,819
1980	150	150	152	152	152	150	151	151	151	151	150	151	1,811
1981	151	151	151	154	151	151	151	151	151	151	151	151	1,815
1982	150	151	151	153	150	152	150	150	150	150	150	150	1,807
1983	150	152	151	153	152	152	150	150	150	150	150	150	1,810
1984	150	151	151	151	151	150	151	151	151	150	150	151	1,808
1985	150	153	151	152	152	152	151	151	151	151	151	151	1,816
1986	151	152	152	154	153	151	151	151	151	150	150	151	1,817
1987	151	151	150	152	152	151	151	151	151	151	151	151	1,813
1988	151	151	152	153	151	151	151	151	151	151	151	151	1,815
1989	151	151	151	152	152	151	151	151	151	151	151	150	1,813
1990	150	150	150	152	152	151	151	151	151	151	151	151	1,811
76 - 90 AVG	151	151	151	153	152	151	151	151	151	151	151	151	1,813

Greens Landing
Maximum Flow
Bromide
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	30	30	30	31	31	30	31	31	31	31	30	31	367
1977	31	30	30	32	31	31	31	31	31	31	31	31	371
1978	31	31	33	32	31	31	30	30	31	30	30	31	371
1979	31	30	30	34	32	30	30	31	31	30	30	31	370
1980	30	30	31	31	31	30	30	31	31	30	30	31	366
1981	31	30	30	32	30	30	31	31	31	31	31	31	369
1982	30	31	30	31	30	31	30	30	30	30	30	30	363
1983	30	31	30	31	31	31	30	30	30	30	30	30	364
1984	30	31	31	30	30	30	30	31	31	30	30	31	365
1985	30	32	30	31	31	31	31	31	31	31	31	31	371
1986	31	32	31	31	31	30	30	31	31	30	30	30	368
1987	31	30	30	31	31	31	31	31	31	31	31	31	370
1988	31	31	31	31	31	31	31	31	31	31	31	31	372
1989	31	31	30	31	31	30	30	31	31	31	31	30	368
1990	30	30	30	31	31	31	31	31	31	31	31	31	369
76 - 90 AVG	31	31	30	31	31	31	30	31	31	31	30	31	368

Greens Landing
Maximum Flow
Dissolved Organic Carbon
Units are in micrograms/liter

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1976	2110	2301	2790	2633	3580	2544	2027	2400	2143	2510	2419	2319	29,776
1977	2131	2296	2774	2654	3575	2549	2041	2395	2140	2508	2436	2328	29,827
1978	2136	2296	2822	2659	3601	2532	2012	2402	2127	2503	2415	2317	29,822
1979	2122	2299	2787	2685	3612	2527	2017	2403	2124	2505	2419	2317	29,817
1980	2114	2297	2810	2628	3606	2518	2014	2400	2131	2505	2416	2319	29,758
1981	2120	2300	2792	2647	3586	2534	2020	2400	2146	2511	2425	2318	29,799
1982	2116	2312	2802	2631	3594	2532	2012	2402	2120	2504	2416	2311	29,752
1983	2111	2324	2800	2632	3604	2531	2010	2399	2110	2506	2413	2309	29,749
1984	2112	2304	2811	2610	3592	2521	2017	2400	2127	2503	2415	2316	29,728
1985	2116	2328	2800	2624	3583	2552	2032	2397	2136	2507	2424	2319	29,818
1986	2124	2315	2807	2651	3602	2519	2019	2400	2135	2501	2415	2316	29,804
1987	2119	2299	2786	2632	3590	2539	2026	2397	2146	2508	2433	2327	29,802
1988	2127	2301	2803	2643	3591	2560	2043	2396	2143	2509	2430	2322	29,868
1989	2126	2300	2786	2637	3573	2538	2014	2401	2132	2505	2427	2314	29,753
1990	2115	2298	2784	2636	3593	2545	2032	2393	2137	2507	2422	2321	29,783
76 - 90 AVG	2120	2304	2796	2640	3590	2537	2022	2399	2133	2506	2422	2318	29,790

Sac River @ Greens Landing, 418
Cumulative Impact
Electrical Conductivity
Units are in microsiemens/centimeter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	150	150	150	152	151	151	151	151	151	151	151	151
1977	151	151	151	153	151	151	151	151	151	151	151	151
1978	151	151	155	155	152	152	150	150	151	150	150	151
1979	151	150	150	158	154	151	151	151	151	150	151	151
1980	150	150	152	152	152	150	151	151	151	151	150	151
1981	151	151	151	154	151	151	151	151	151	151	151	151
1982	150	151	151	153	150	152	150	150	150	150	151	150
1983	150	152	151	153	152	152	150	150	150	150	150	150
1984	150	151	151	151	151	150	151	151	151	150	150	151
1985	150	153	151	152	152	152	151	151	151	151	151	151
1986	151	152	152	154	153	151	151	151	151	150	150	151
1987	151	151	150	152	152	151	151	151	151	151	151	151
1988	151	151	152	153	151	151	151	151	151	151	151	151
1989	151	151	151	152	152	151	151	151	151	151	151	150
1990	150	150	150	153	152	151	151	151	151	151	151	151
Average	151	151	151	153	152	151	151	151	151	151	151	151

Sac River @ Greens Landing, 418
Cumulative Impact
Bromide
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	30	30	30	31	31	31	31	31	31	31	30	31
1977	31	30	30	31	31	31	31	31	31	31	31	31
1978	31	31	33	32	31	31	30	30	31	30	30	31
1979	31	30	30	34	32	30	30	31	31	30	30	31
1980	30	30	31	31	31	30	30	31	31	30	30	31
1981	31	30	30	32	30	30	31	31	31	31	31	31
1982	31	31	30	31	30	31	30	30	30	30	30	30
1983	30	31	30	31	31	31	30	30	30	30	30	30
1984	30	30	31	30	30	30	30	31	31	30	30	31
1985	30	32	30	31	31	31	31	31	31	31	31	31
1986	31	32	31	32	31	30	30	31	31	30	30	30
1987	31	30	30	31	31	31	31	31	31	31	31	31
1988	31	31	31	31	31	31	31	31	31	31	31	31
1989	31	31	30	31	31	30	30	31	31	31	31	30
1990	30	30	30	31	31	30	31	31	31	31	31	31
Average	31	31	30	31	31	31	30	31	31	31	30	31

Sac River @ Greens Landing, 418
Cumulative Impact
Dissolved Organic Carbon
Units are in micrograms/liter

Year	October	November	December	January	February	March	April	May	June	July	August	September
1976	2110	2301	2790	2633	3579	2545	2027	2400	2143	2510	2420	2319
1977	2132	2295	2773	2650	3575	2549	2041	2395	2140	2508	2436	2328
1978	2138	2296	2822	2659	3601	2532	2013	2402	2127	2504	2415	2317
1979	2123	2296	2786	2686	3612	2527	2017	2403	2124	2505	2418	2317
1980	2115	2298	2810	2628	3606	2519	2015	2399	2130	2505	2415	2319
1981	2121	2300	2791	2647	3586	2534	2021	2400	2146	2511	2424	2317
1982	2117	2312	2801	2631	3594	2533	2012	2402	2121	2504	2417	2311
1983	2111	2323	2800	2632	3604	2531	2010	2399	2110	2506	2414	2309
1984	2112	2303	2811	2610	3592	2521	2018	2400	2126	2503	2415	2316
1985	2116	2328	2800	2625	3583	2552	2032	2397	2135	2507	2424	2319
1986	2124	2315	2807	2652	3601	2519	2019	2400	2135	2501	2415	2316
1987	2120	2299	2786	2632	3589	2539	2027	2398	2146	2508	2434	2327
1988	2127	2301	2803	2644	3591	2560	2038	2396	2143	2510	2432	2321
1989	2126	2300	2786	2637	3573	2538	2014	2401	2132	2505	2426	2314
1990	2115	2297	2783	2637	3593	2543	2032	2393	2138	2509	2426	2321
Average	2120	2304	2797	2640	3592	2536	2022	2399	2133	2506	2422	2318

2.4.2 Technical Appendix B—Fishery Resources

1.1 Anadromous Salmonid Species *(SEE SUBSECTIONS)*

1.1.1 Affected Environment **(CHANGES FOLLOW)**
pg. B-1

Native anadromous salmonid species currently found in the Trinity River Basin and the Lower Klamath River Basin/ Coastal Areas includes spring, fall, and late-fall chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and steelhead (*O. mykiss irideus*). In addition, coastal cutthroat trout (*O. clarki clarki*) are found in the Lower Klamath River Basin/ Coastal Area. In the Central Valley, chinook salmon (fall, late-fall, spring, and winter) and winter steelhead, but not coho salmon and cutthroat trout, constitute the native anadromous salmonids in that geographical area.

1.1.1.1 Trinity River Basin **(CHANGES FOLLOW)**
pg. B-2

The data in Table B-3 is not relevant to the text that references it on page B-2. Table B-3 has been replaced with a table that accurately represents the data and text. See Section 2.4.2.1 for new Table B-3.

Figure B-2 has been modified to more accurately depict downstream migration of juvenile chinook salmon and to include the juvenile rearing periods of chinook and coho salmon and steelhead. See Section 2.4.2.1 for revised Figure B-2.

Trinity River Restoration Program Goals.
pg. B-6

Coho Salmon. Coho salmon populations were historically much smaller than chinook salmon in the Trinity River. Holmberg (1972) reported that the estimated number of coho salmon in the Trinity Basin was approximately 8,000. An average annual pre-dam spawner escapement of approximately 5,000 adult coho above Lewiston was cited by CDFG and Service (1956). After construction of Lewiston Dam, coho inriver escapement estimates below Lewiston ranged from approximately 460-2,100 during 1969 through 1971 (Smith, 1975; Rogers, 1972; and Rogers, 1982). Leidy and Leidy (1984) reported that the returns to Trinity River Hatchery for the period 1973-1980 averaged approximately 3,300 adults. ~~total annual average coho basin escapement for the Trinity River below Lewiston Dam for 1973 through 1980 was approximately 3,300 adults.~~

pgs. B-6 and B-7

Estimates of the naturally produced coho salmon spawning in the mainstem Trinity River upstream of the Willow Creek weir for the years 1991 through 1995 have been made (U.S. Fish and Wildlife Service, 1998). Table B-4 shows the average estimated spawner escapement of naturally and hatchery-produced coho salmon for the years 1991 through 1995. From 1991 through 1995 naturally produced coho salmon spawning in the Trinity River upstream of the Willow Creek weir averaged 200 fish, ranging from 0-14 percent of the total annual escapement (an annual average of 3 percent). Approximately ~~8,100~~ 98 percent (5,500) of the coho salmon spawning inriver are produced by the hatchery.

pg. B-8

Species Listed and Proposed for Listing under the Endangered Species Act (ESA). After a coast-wide status review by the U.S. National Marine Fisheries Service (NMFS), the Southern Oregon/ Northern California evolutionarily significant unit (ESU) naturally produced coho salmon was proposed for listing as threatened on July 25, 1995. Under the ESA, an ESU is a population (or group of populations) that:

- Is substantially reproductively isolated from other nonspecific population units
- Represents an important component in the evolutionary legacy of the species

Factors Influencing Trinity River Basin's Anadromous Salmonid Populations. pg. B-10

Fish Harvest. The harvest of Klamath River Basin fall chinook salmon (including Trinity River Basin) is managed jointly by the CDFG, Oregon Department of Fish and Wildlife, California Fish and Game Commission, (Commission) Yurok Tribe, HVT, NMFS, and Bureau of Indian Affairs (BIA). The Pacific Fishery Management Council (PFMC) and the Klamath Fishery Management Council (KFMC) are allocation forums for the ocean and ocean/ inriver fisheries, respectively. The mixed-stock ocean population is harvested by commercial and sport fisheries; and the inriver population is harvested by tribal (ceremonial, subsistence, and commercial) and sport fisheries. Chinook salmon harvest (both spring and fall runs) includes both naturally and hatchery-produced fish. ~~Coho salmon harvest has been prohibited along virtually the entire west coast since 1994.~~ Coho harvest in the ocean commercial troll fishery has been prohibited in California and Oregon, and reduced in Washington, since 1994. Coho harvest has also been prohibited in the California ocean sport fishery, and reduced in Oregon. Coho harvest is allowed in the tribal inriver fisheries and currently occurs as incidental take during the harvest of chinook salmon. Steelhead are rarely caught in the ocean commercial and sport fisheries, but are harvested by the inriver tribal and sport fisheries. Frederiksen, Kamine, and Associates (1980) stated that ocean harvest of naturally produced salmon stocks had been sufficient to have caused steady declines in Trinity River spawner escapements at the time of their report. Historically, Klamath/ Trinity River chinook and coho populations have been harvested in the ocean from Monterey County, California, to the Oregon/ Washington border. Ocean harvest of naturally produced salmon may have been sufficient in the late 1970s to cause declines in Klamath River Basin (including Trinity River) populations, but fall chinook harvest management restrictions implemented since 1986 have decreased harvest impacts to levels believed to be sustainable, based on the best available data. A description of sportfishing activity along the Trinity River is presented in the Recreation Resources Technical Appendix D. Information on tribal fisheries is presented in the Tribal Trust section (3.6).

1.1.1.2 Lower Klamath River Basin *(NO CHANGE)*

1.1.1.3 Coastal Area **(CHANGES FOLLOW)**

Harvest.
pg. B-19

Salmon harvest trends have been somewhat different south of the KMZ, with average harvest levels remaining relatively high through the late 1980s. In the Mendocino Region (equivalent to the PFMC and CDFG statistical area of Fort Bragg), commercial harvests have annually averaged 205,000 salmon and 1.9 million pounds between 1971 and 1990. As Table B-9 shows, harvest levels generally declined between 1976 and 1985, but substantially increased between 1986 and 1990. Since 1989, commercial salmon harvest in the region has fallen, almost disappearing between 1992 and 1995, before rebounding to a harvest level of 20,000 salmon in 1996. This harvest level is still 90 percent lower than average levels between 1971 and 1990.

Gross Value of Commercial Harvest.
pg. B-20

In California, gross revenues from commercial salmon fishing totaled $5.7 million in 1996, which is ~~substantially~~ lower than the $~~22.7~~ 7.8 million (in 1997 dollars) in average gross income generated by the commercial salmon fishing industry between 1971 and 1990. The distribution of gross revenue among California coastal regions in 1996 was as follows: KMZ-California, 3.7 percent; Mendocino, 6.6 percent; San Francisco, 38.5 percent; Monterey, 51.2 percent. Historically, the KMZ-California and Mendocino Regions have registered much larger shares of gross revenues generated statewide by the ocean commercial salmon industry.

1.1.1.4 Central Valley *(NO CHANGE)*
1.1.2 Environmental Consequences *(NO CHANGE)*

1.2 Other Native Anadromous Fish *(SEE SUBSECTIONS)*
1.2.1 Affected Environment *(SEE SUBSECTIONS)*
1.2.1.1 Trinity River Basin *(NO CHANGE)*

1.2.1.2 Lower Klamath River Basin **(CHANGES FOLLOW)**
pg. B-63

The main population of eulachon in California occurs in the Klamath River (Moyle, et al., 1995). These native anadromous species spend most of their lives in salt water, migrating into the Klamath in March and April. Eulachon penetrate no more than approximately 6-8 miles upstream of the mouth of the Klamath River. Mass spawning occurs following their arrival during nighttime hours. After hatching, the larvae are swept downstream to the ocean immediately. Eulachon populations in the Klamath estuary have been severely depressed since the mid 1980s.

1.2.1.3 Coastal Area *(NO CHANGE)*
1.2.1.4 Central Valley *(NO CHANGE)*
1.2.2 Environmental Consequences *(NO CHANGE)*

1.3 Resident Native Fish *(SEE SUBSECTIONS)*
1.3.1 Affected Environment *(SEE SUBSECTIONS)*

1.3.1.1 Trinity River Basin *(NO CHANGE)*

1.3.1.2 Lower Klamath River Basin **(CHANGES FOLLOW)**
pg. B-76

In addition to the native resident species found in the Trinity River Basin, marbled sculpin *(Cottus klamathensis)*, prickly sculpin (*Cottus asper*), threespine stickleback *(Gasterosteous aculeatus)*, staghorn sculpin *(Leptocottus armatus)*, longfin smelt (*Spirinchus thaleichthys*), and starry flounder *(Platichthys stellatus)* are known to occur in the lower Klamath River Basin (Moyle, 1976). Except for marbled sculpins, these fish are species that range into estuarine, marine, and adjacent freshwater habitats. Other marine species such as topsmelt, shiner perch, arrow goby, and sharpnose sculpin may occasionally occur in the lower Klamath River estuary. The abundance and distribution of all of these species and the factors affecting their abundance in the lower Klamath River Basin are not known.

Non-native species known to occur in the lower Klamath are similar to those found in upstream areas including the reservoirs. Some of these species include yellow perch, black crappie, green sunfish, golden shiner, and brown bullhead.

1.3.1.3 Coastal Area *(NO CHANGE)*
1.3.1.4 Central Valley *(NO CHANGE)*
1.3.2 Environmental Consequences *(NO CHANGE)*

1.4 Non-native Fish *(SEE SUBSECTIONS)*
1.4.1 Affected Environment *(SEE SUBSECTIONS)*

1.4.1.1 Trinity River Basin and Lower Klamath River Basin/Coastal Area **(CHANGES FOLLOW)**
pg. B-91

American shad were introduced to California from the eastern United States beginning with introductions into the Sacramento River in 1871 through 1881 (Moyle, 1976). This anadromous species has since established populations in the Sacramento and its southernmost tributaries and the San Joaquin River Basin, including the Mokelumne and Stanislaus Rivers. In addition, populations in the Russian, Eel, Klamath, and Trinity River Basins have become established. The adults of this species move into the estuary or fresh water in late spring or early summer and spawn upriver soon thereafter. ~~in the fall months prior to spawning which occurs in March through June.~~

1.4.1.2 Central Valley *(NO CHANGE)*
1.4.2 Environmental Consequences *(NO CHANGE)*

1.5 Reservoirs *(NO CHANGE)*
1.5.1 Affected Environment *(NO CHANGE)*
1.5.2 Environmental Consequences *(NO CHANGE)*

1.6 Bibliography (CHANGES FOLLOW)

The following reference has been added:

pg. B-126

Rowell, J., U.S. Bureau of Reclamation, Sacramento, CA. 1998. Personal communication with Tim Hamaker, Fisheries Biologist, CH2M HILL, Redding, CA. 10 July.

2.4.2.1 Technical Appendix B—Tables and Figures

Tables

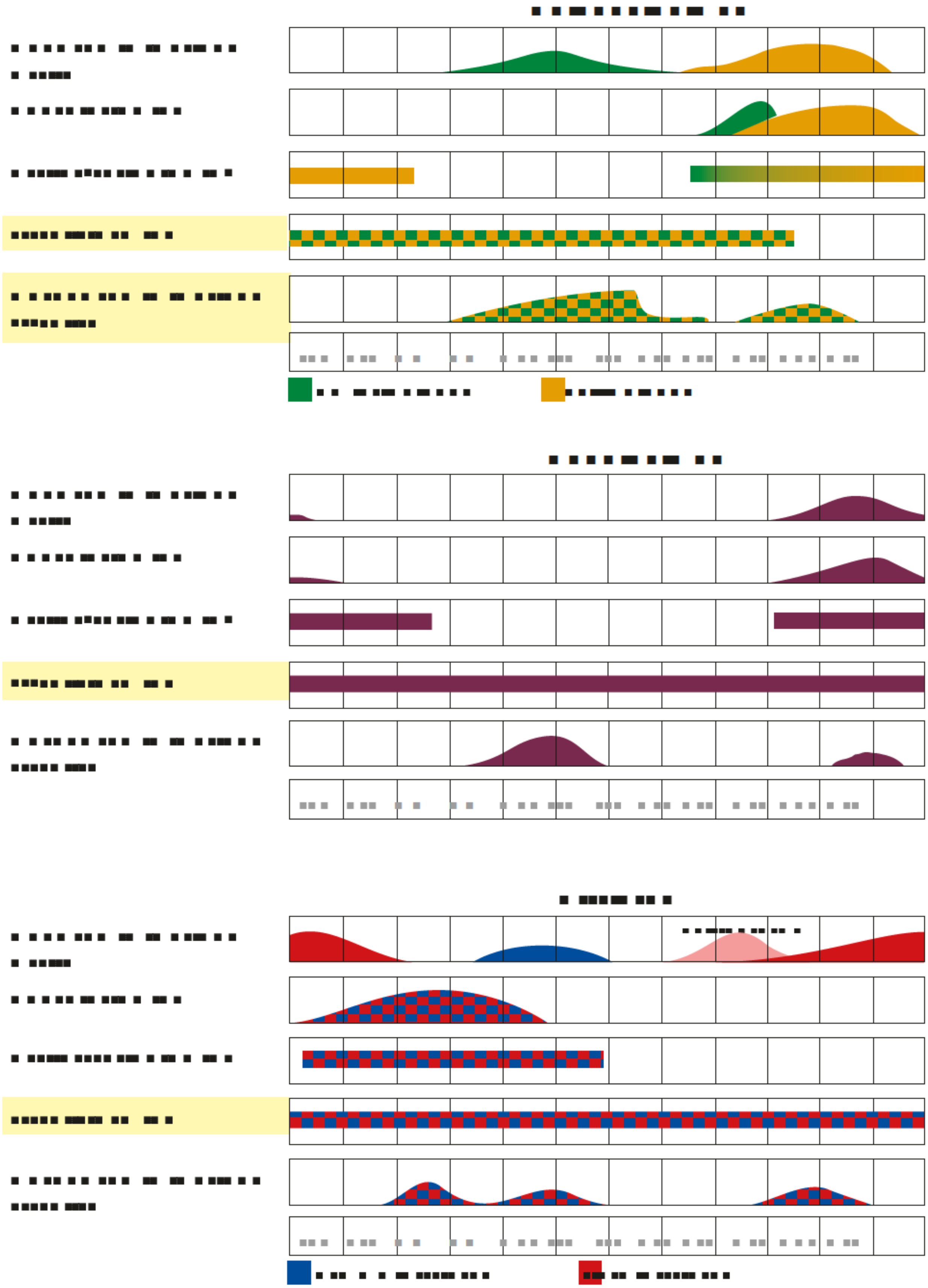
Figures

~~Table B-3~~
~~Life History and Habitat Characteristics of Non-salmonid Native Anadromous Fish in the Trinity River and/or Klamath River Basins~~

~~Species~~	~~Inriver Goals~~	~~Hatchery Goals~~	~~Total~~
~~Fall chinook salmon~~	~~62,000~~	~~9,000~~	~~71,000~~
~~Spring chinook salmon~~	~~6,000~~	~~3,000~~	~~9,000~~
~~Coho salmon~~	~~1,400~~	~~2,100~~	~~3,500~~
~~Steelhead~~	~~40,000~~	~~10,000~~	~~50,000~~

TABLE B-3
Life History and Habitat Needs for Anadromous Salmonid Fish in the Trinity River Basin

Name	Migration	Spawning	Rearing	Rearing Habitat Description
Chinook (spring)	Spring-Summer	Early Fall	Winter-Spring-Summer	Shallow, slow-moving waters adjacent to higher water velocities for feeding.
Chinook (fall)	Fall	Fall	Spring-Summer-Fall	Shallow, slow-moving waters adjacent to higher water velocities for feeding.
Steelhead (winter)	Fall-winter	February-April	Year round	Areas of clean cobble where there is refuge from high velocities; juveniles overwinter for 1-2 or more years.
Steelhead (summer)	Spring-Summer	February-April	Year round	Areas of clean cobble where there is refuge from high velocities; juveniles overwinter for 1-2 or more years.



2.4.2.2 Technical Appendix B—Attachments

Attachment B1	Tables B1-1 through B1-10	*(NO CHANGE)*
Attachment B2	Trinity River Basin Year Type Designations	*(NO CHANGE)*
Attachment B3	Overview of TR FCR Team 12/15/97 Meeting - Draft and Final 1/30/98) - Memo summarizing approach for determining numbers of anadromous fish	*(NO CHANGE)*
Attachment B4	Trinity River Temperature Attribute Scoring Analysis Results	*(NO CHANGE)*
Attachment B5	Weekly Flow Schedules for Each Project Alternative	*(NO CHANGE)*
Attachment B6	Methods Used to Develop Harvest-escapement Ratios for Trinity River EIS	*(NO CHANGE)*
Attachment B7	Alternative Analyses Considered for the Harvest Management Alternative	*(NO CHANGE)*
Attachment B8	Alternative Analyses Considered for the Harvest Management Alternative	*(NO CHANGE)*
Attachment B9	Another Way to Assess the Harvest Management Alternative	*(NO CHANGE)*
Attachment B10	Justification of No Natural Production for the State Permit Alternative	*(NO CHANGE)*
Attachment B11	Summary of Sacramento River Chinook Salmon Spawning Distributions	*(NO CHANGE)*
Attachment B12	Results of Attribute Scoring the Ecosystem Objectives for the Simulated 1922-1990 Hydrology	*(NO CHANGE)*
Attachment B13	Assumptions and Rationale for Scoring the Ecosystem Attributes for the Simulated 1912-1995 Hydrology	*(NO CHANGE)*
Attachment B14	Results of the Reclamation Sacramento River Chinook Salmon Loss of Early Life Stages and Temperature Model Analysis	**(CHANGES FOLLOW)**

The incorrect data output tables dated 3/10/98 have been replaced with the correct data output tables dated 7/8/99.

Attachment B15	Analysis of the Harvest Management Alternative of the Trinity River EIS/EIR	*(NO CHANGE)*
Attachment B16	Assessment of the Ocean Troll Harvest Levels for the Trinity River EIS/EIR	*(NO CHANGE)*
Attachment B17	Reservoir Fisheries Evaluation Report	*(NO CHANGE)*

Attachment B14

TRINITY RIVER EIS: PROSIM 2-25-99 - FLOW EVALUATION STUDY (TRN_FES9) - 2020 LEVEL

SACRAMENTO RIVER SALMON LOSS SUMMARY - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	4.675	0.241	1.733	3.725
1923	3.707	0.189	3.864	2.961
1924	29.223	1.140	67.799	96.553
1925	6.655	1.516	2.890	3.847
1926	10.981	2.111	7.613	5.338
1927	5.256	0.182	1.291	3.082
1928	4.356	0.511	1.334	2.495
1929	20.037	3.999	1.209	5.037
1930	6.491	0.602	1.822	3.271
1931	32.868	1.301	84.914	97.980
1932	38.536	3.619	21.642	99.628
1933	41.228	3.899	9.766	99.966
1934	35.514	2.541	30.988	98.956
1935	31.485	1.811	4.617	91.750
1936	41.983	5.525	3.833	90.430
1937	21.804	1.098	1.249	16.517
1938	12.993	1.157	1.634	7.575
1939	11.279	1.951	1.318	3.804
1940	5.451	0.846	2.367	3.038
1941	6.365	0.582	0.940	2.365
1942	5.424	0.129	1.012	2.956
1943	5.377	0.359	1.092	3.050
1944	7.008	0.182	0.957	3.673
1945	9.551	0.389	1.025	3.516
1946	3.735	0.210	0.482	2.160
1947	14.147	1.206	2.777	6.065
1948	7.498	0.075	0.796	3.371
1949	3.113	0.851	1.207	2.046
1950	4.411	0.346	0.952	2.572
1951	5.978	0.617	1.141	3.780
1952	5.477	0.278	1.135	3.754
1953	6.425	0.034	0.709	4.522
1954	8.355	0.238	0.468	3.162
1955	7.265	0.485	1.975	5.315
1956	4.683	0.382	1.886	3.479
1957	5.472	0.367	1.412	3.421
1958	15.476	4.251	1.254	6.687
1959	22.696	2.862	3.053	14.203
1960	9.315	0.277	1.753	5.715
1961	11.059	0.316	1.144	6.196
1962	12.873	1.156	1.335	5.647
1963	11.244	1.413	2.304	7.715
1964	6.851	0.192	1.341	4.435
1965	6.116	0.399	3.785	3.489
1966	6.742	0.317	0.972	4.076
1967	15.214	1.478	1.015	9.351
1968	7.027	0.261	1.240	4.794
1969	4.950	0.318	1.349	4.371
1970	7.062	0.485	1.496	5.009
1971	6.939	0.112	1.075	4.798
1972	4.391	0.208	0.840	3.428
1973	4.139	1.161	2.667	4.194
1974	6.333	0.744	1.954	4.630
1975	10.794	0.331	1.339	8.458
1976	20.543	3.327	1.572	12.124
1977	33.942	1.276	47.204	97.957
1978	6.917	0.366	3.134	4.249
1979	6.244	0.597	1.309	3.552
1980	4.632	0.341	1.210	2.870
1981	7.101	0.554	1.702	4.871
1982	3.159	2.059	1.993	2.862
1983	8.636	0.418	0.903	2.285
1984	5.187	0.395	1.880	4.084
1985	2.918	0.551	1.366	2.968
1986	4.945	0.293	2.104	2.868
1987	7.943	0.445	0.783	4.058
1988	19.153	0.879	3.888	9.746
1989	5.990	0.477	1.903	4.242
1990	23.042	1.301	1.538	17.408
AVERAGE	11.658	1.022	5.424	15.630

Attachment B14

CVPIA-PEIS: PROSIM 5-4-9 9 - CUMULATIV E IMPACTS (P9 9N_CI2) - 2020 LEVEL

SACRAMENTO RIVER SALMON LOSS SUMMARY - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	3.804	0.866	2.336	3.869
1923	4.469	0.256	3.918	3.063
1924	28.78	1.108	81.376	96.564
1925	9.043	2.129	3.995	4.717
1926	7.396	1.725	7.724	6.638
1927	4.819	0.205	1.18	2.729
1928	13.76	1.342	1.368	3.74
1929	23.29	4.5	1.731	7.297
1930	8.329	1.071	1.85	3.319
1931	33.243	1.309	91.024	98.237
1932	38.909	3.328	58.242	99.75
1933	40.774	3.417	43.474	99.953
1934	34.445	2.811	88.987	98.528
1935	34.542	2.496	19.077	98.847
1936	42.727	5.672	2.407	89.675
1937	23.814	1.502	1.635	29.913
1938	12.945	1.178	1.565	6.529
1939	9.73	1.438	1.672	4.066
1940	18.254	1.739	2.101	7.677
1941	5.43	0.498	1.215	2.176
1942	5.181	0.146	1.124	2.8
1943	4.552	0.324	0.951	2.407
1944	8.132	0.253	1.406	3.768
1945	23.171	0.875	0.838	18.009
1946	11.855	0.529	0.495	3.066
1947	13.368	1.299	1.707	5.745
1948	7.347	0.24	1.004	2.838
1949	2.5	0.673	1.247	2.16
1950	4.686	0.39	1.003	2.234
1951	3.793	0.855	1.404	2.873
1952	6.089	0.247	1.121	3.446
1953	6.341	0.095	1.023	4.546
1954	4.774	0.462	0.808	1.892
1955	6.852	0.861	2.051	4.403
1956	4.068	0.45	2.099	3.075
1957	5.009	0.307	1.295	2.791
1958	15.182	4.483	1.285	6.419
1959	26.198	3.302	3.573	17.235
1960	6.205	0.417	3.02	4.278
1961	6.552	0.246	1.936	4.416
1962	14.417	1.473	1.334	5.231
1963	8.419	1.131	2.03	4.87
1964	6.088	0.255	1.382	3.922
1965	4.79	0.573	4.997	2.97
1966	7.986	0.38	1.04	3.988
1967	14.855	1.555	0.967	8.385
1968	6.728	0.363	2.096	4.149
1969	4.691	0.294	1.289	3.768
1970	5.458	0.6	2.169	3.414
1971	6.737	0.149	1.039	3.988
1972	4.103	0.112	0.593	2.383
1973	3.534	0.964	2.025	3.956
1974	6.932	0.645	1.946	5.396
1975	10.627	0.44	1.403	8.375
1976	18.029	2.858	2.044	8.749
1977	35.313	1.114	93.602	98.701
1978	5.401	0.327	3.067	3.521
1979	6.966	0.688	1.512	3.756
1980	3.87	0.25	1.144	3.108
1981	5.704	0.32	2.061	5.049
1982	2.724	1.919	1.943	2.516
1983	8.185	0.401	0.918	2.213
1984	5.025	0.241	1.596	3.861
1985	3.018	0.56	1.61	3.214
1986	13.273	0.95	1.78	3.233
1987	8.05	0.432	1.51	6.019
1988	18.781	0.929	4.541	9.34
1989	3.888	0.509	2.038	3.729
1990	23.411	1.354	1.926	18.269
AVERAGE	12.136	1.114	8.578	16.026

Attachment B14

TRINITY RIVER EIS: (STATE PERMIT - NO ACTION) - PROSIM (1-4-99) - 2020 LEVEL

SACRAMENTO RIVER SALMON LOSS DIFFERENCE - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	-0.176	0.013	-0.123	0.105
1923	0.411	0.002	0.026	0.259
1924	-2.789	-0.172	-10.838	-22.078
1925	-0.796	-0.057	0.01	0.229
1926	1.153	0.014	-0.412	-0.147
1927	-2.148	-0.014	0.035	0.034
1928	-0.124	-0.022	0.022	0.236
1929	-1.493	-0.395	-0.086	-0.186
1930	0.78	-0.097	-1.026	-0.004
1931	-1.424	-0.099	-9.801	-0.943
1932	-2.617	-0.17	-1.578	-29.21
1933	-0.152	-0.081	0.232	-0.014
1934	-0.179	-0.173	0.906	-0.077
1935	-3.325	-0.174	-1.952	-37.853
1936	-7.044	-0.936	1.063	-47.969
1937	-18.864	-0.808	-0.146	-36.52
1938	-0.495	-0.243	-0.277	-0.818
1939	3.902	0.415	-0.353	0.008
1940	-0.33	0.127	0.227	0.193
1941	-0.313	-0.005	-0.146	-0.078
1942	-0.52	-0.009	-0.07	-0.203
1943	-0.481	-0.006	0.016	0.178
1944	0.106	-0.005	-0.077	0.372
1945	-1.352	-0.016	0.096	0.15
1946	-0.077	-0.005	0.023	0.136
1947	0.223	-0.093	-0.304	-0.259
1948	0.102	-0.009	-0.005	0.33
1949	0.516	0.05	0.079	0.212
1950	-1.191	0.001	0.033	0.029
1951	0.322	-0.081	-0.062	0.556
1952	-0.603	-0.016	-0.07	-0.403
1953	-0.586	-0.005	-0.073	-0.699
1954	-0.266	-0.006	0.025	0.247
1955	1.244	-0.038	-0.072	0.509
1956	-0.456	-0.047	-0.385	-0.263
1957	0.046	-0.004	0.115	0.413
1958	-0.449	-0.024	-0.009	-0.637
1959	-2.024	-0.754	-0.163	0.466
1960	-0.935	-0.079	-0.057	0.63
1961	0.322	-0.047	0.131	0.864
1962	-2.568	-0.107	0.118	-0.048
1963	-0.567	-0.687	-0.658	-0.655
1964	1.47	0.006	-0.216	0.078
1965	-1.419	-0.011	-0.087	-0.096
1966	0.008	-0.012	-0.087	0.031
1967	-0.689	-0.051	-0.038	-0.916
1968	-0.153	0.005	0.005	0.283
1969	-0.491	-0.088	-0.167	-0.399
1970	0.348	0.027	0.028	0.381
1971	-0.672	-0.013	-0.066	-0.363
1972	-0.065	0.007	0.036	0.26
1973	0.345	-0.42	-0.48	0.255
1974	-0.354	-0.046	-0.074	-0.157
1975	-1.15	-0.039	-0.088	-1.496
1976	0.94	0.12	-0.088	1.774
1977	-0.076	0.102	-15.349	0.134
1978	-0.675	0.003	-0.111	0.197
1979	-0.204	-0.15	-0.08	0.191
1980	-0.529	-0.005	0.002	0.258
1981	0.565	0.015	0.044	0.491
1982	-0.446	-0.647	-0.389	-0.289
1983	-0.28	-0.015	0	-0.024
1984	0.318	0.004	-0.102	0.616
1985	0.506	0.01	-0.162	-0.334
1986	0.205	-0.002	-0.356	0.121
1987	-0.319	-0.016	-0.149	-0.206
1988	-4.113	-0.306	-0.616	-2.079
1989	-1.875	-0.142	-0.129	-0.017
1990	-1.567	-0.076	-0.139	-8.354
AVERAGE	-0.806	-0.096	-0.644	-2.646

Attachment B14

TRINITY RIVER EIS: (STATE PERMIT - NO ACTION) - PROSIM (1-4-99) - 2020 LEVEL

SACRAMENTO RIVER SALMON LOSS DIFFERENCE - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	-0.176	0.013	-0.123	0.105
1923	0.411	0.002	0.026	0.259
1924	-2.789	-0.172	-10.838	-22.078
1925	-0.796	-0.057	0.01	0.229
1926	1.153	0.014	-0.412	-0.147
1927	-2.148	-0.014	0.035	0.034
1928	-0.124	-0.022	0.022	0.236
1929	-1.493	-0.395	-0.086	-0.186
1930	0.78	-0.097	-1.026	-0.004
1931	-1.424	-0.099	-9.801	-0.943
1932	-2.617	-0.17	-1.578	-29.21
1933	-0.152	-0.081	0.232	-0.014
1934	-0.179	-0.173	0.906	-0.077
1935	-3.325	-0.174	-1.952	-37.853
1936	-7.044	-0.936	1.063	-47.969
1937	-18.864	-0.808	-0.146	-36.52
1938	-0.495	-0.243	-0.277	-0.818
1939	3.902	0.415	-0.353	0.008
1940	-0.33	0.127	0.227	0.193
1941	-0.313	-0.005	-0.146	-0.078
1942	-0.52	-0.009	-0.07	-0.203
1943	-0.481	-0.006	0.016	0.178
1944	0.106	-0.005	-0.077	0.372
1945	-1.352	-0.016	0.096	0.15
1946	-0.077	-0.005	0.023	0.136
1947	0.223	-0.093	-0.304	-0.259
1948	0.102	-0.009	-0.005	0.33
1949	0.516	0.05	0.079	0.212
1950	-1.191	0.001	0.033	0.029
1951	0.322	-0.081	-0.062	0.556
1952	-0.603	-0.016	-0.07	-0.403
1953	-0.586	-0.005	-0.073	-0.699
1954	-0.266	-0.006	0.025	0.247
1955	1.244	-0.038	-0.072	0.509
1956	-0.456	-0.047	-0.385	-0.263
1957	0.046	-0.004	0.115	0.413
1958	-0.449	-0.024	-0.009	-0.637
1959	-2.024	-0.754	-0.163	0.466
1960	-0.935	-0.079	-0.057	0.63
1961	0.322	-0.047	0.131	0.864
1962	-2.568	-0.107	0.118	-0.048
1963	-0.567	-0.687	-0.658	-0.655
1964	1.47	0.006	-0.216	0.078
1965	-1.419	-0.011	-0.087	-0.096
1966	0.008	-0.012	-0.087	0.031
1967	-0.689	-0.051	-0.038	-0.916
1968	-0.153	0.005	0.005	0.283
1969	-0.491	-0.088	-0.167	-0.399
1970	0.348	0.027	0.028	0.381
1971	-0.672	-0.013	-0.066	-0.363
1972	-0.065	0.007	0.036	0.26
1973	0.345	-0.42	-0.48	0.255
1974	-0.354	-0.046	-0.074	-0.157
1975	-1.15	-0.039	-0.088	-1.496
1976	0.94	0.12	-0.088	1.774
1977	-0.076	0.102	-15.349	0.134
1978	-0.675	0.003	-0.111	0.197
1979	-0.204	-0.15	-0.08	0.191
1980	-0.529	-0.005	0.002	0.258
1981	0.565	0.015	0.044	0.491
1982	-0.446	-0.647	-0.389	-0.289
1983	-0.28	-0.015	0	-0.024
1984	0.318	0.004	-0.102	0.616
1985	0.506	0.01	-0.162	-0.334
1986	0.205	-0.002	-0.356	0.121
1987	-0.319	-0.016	-0.149	-0.206
1988	-4.113	-0.306	-0.616	-2.079
1989	-1.875	-0.142	-0.129	-0.017
1990	-1.567	-0.076	-0.139	-8.354
AVERAGE	-0.806	-0.096	-0.644	-2.646

Attachment B14

TRINITY RIVER EIS: (% INFLOW - NO ACTION) - PR OSIM (12-2 1-98) - 2020 LEVEL

SACRAMENTO RIVER SALMON LOSS DIFFERENCE - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	-0.008	0.033	0.053	0.17
1923	0.227	0.001	0.016	0.152
1924	-0.086	-0.139	1.719	-0.25
1925	-0.541	-0.086	-0.17	0.412
1926	-0.107	0.028	0.361	0.635
1927	-0.096	0.002	0.141	0.163
1928	1.068	0.112	0.173	0.215
1929	6.266	0.641	-0.014	2.584
1930	1.165	0.03	-0.825	0.134
1931	-0.568	-0.088	2.177	-0.261
1932	-0.497	-0.041	-0.55	-5.16
1933	0.155	-0.053	1.983	-0.002
1934	-0.341	-0.129	-0.107	-0.15
1935	-1.329	-0.223	-0.828	-14.484
1936	-1.822	-0.409	0.866	-4.409
1937	-4.046	-0.203	-0.225	-24.531
1938	1.557	0.207	0.213	1.64
1939	0.229	0	0.014	0.226
1940	0.715	-0.024	-0.102	0.105
1941	-0.399	0.07	0.346	-0.011
1942	-0.479	0.035	0.168	-0.042
1943	0.051	0.048	0.164	0.345
1944	0.392	0.002	-0.018	0.225
1945	0.56	-0.002	-0.039	0.215
1946	0.495	-0.006	-0.004	0.261
1947	1.52	0.081	0.08	0.739
1948	0.723	0.007	0.062	0.422
1949	0.158	-0.002	0.017	0.154
1950	0.565	0.012	-0.02	0.06
1951	0.131	0.096	0.044	0.35
1952	-0.672	0.147	0.282	-0.184
1953	-0.689	0.016	0.169	-0.695
1954	0.481	0.005	-0.006	0.237
1955	1.307	0.009	0.131	0.619
1956	0.098	0.066	0.67	0.294
1957	0.537	0.175	0.213	0.459
1958	-0.364	0.009	0.073	-0.468
1959	5.916	0.392	0.701	4.949
1960	3.481	0.169	0.063	1.811
1961	3.465	0.188	-0.034	2.001
1962	1.43	-0.017	-0.016	0.796
1963	1.381	0.127	0.071	0.648
1964	0.469	0.011	0.219	0.677
1965	0.069	-0.013	0.155	0.234
1966	0.833	0.078	0.062	0.061
1967	1.384	0.107	0.171	2.049
1968	0.647	0.172	1.627	0.619
1969	-0.159	0.089	0.207	0.208
1970	1.348	0.122	0.96	0.488
1971	1.279	0.048	0.164	0.762
1972	0.417	0.004	0.3	0.196
1973	0.441	0.154	0.032	0.518
1974	-0.128	0.331	0.449	0.26
1975	-1.208	0.101	0.214	-1.482
1976	8.08	0.828	0.073	11.698
1977	-0.094	-0.074	3.318	-0.069
1978	-0.135	0.018	0.181	0.295
1979	0.437	0.025	0.076	0.493
1980	0.137	-0.008	0.229	0.635
1981	0.247	0.03	0.075	0.289
1982	0.373	0.004	0.214	0.439
1983	-0.263	0.011	0.016	-0.02
1984	0.382	0.003	0.959	0.479
1985	0.435	0.03	0.109	0.291
1986	0.725	0.001	-0.017	0.042
1987	0.992	0.057	0.367	1.135
1988	4.504	0.273	0.251	5.114
1989	0.876	0.01	0.05	0.713
1990	0.802	0.027	0.255	6.84
AVERAGE	0.651	0.054	0.271	0.048

Attachment B14

TRINITY RIVER EIS: (FLOW EVAL - NO ACTION) - PROSIM (2-25-99) - 2020 LEVEL

SACRAMENTO RIVER SALMON LOSS DIFFERENCE - %

YEAR	Fall	Late-Fall	Winter	Spring
1922	-0.3	0.032	-0.018	0.015
1923	0.35	-0.002	0.088	0.255
1924	0.739	-0.098	51.62	1.527
1925	2.436	0.473	0.322	0.838
1926	3.505	0.399	0.533	1.096
1927	-0.854	-0.007	0.156	0.124
1928	0.578	0.085	0.194	0.268
1929	4.233	0.841	0.009	1.185
1930	1.853	0.175	-1.139	0.02
1931	-2.11	-0.456	63.566	-0.975
1932	2.189	0.002	16.815	5.813
1933	0.341	0.051	4.727	0.000
1934	-0.233	0.6	3.502	-0.096
1935	1.279	0.135	0.256	6.488
1936	2.117	0.373	0.616	4.988
1937	-3.578	-0.175	-0.223	-23.285
1938	3.491	0.322	0.216	1.824
1939	4.626	1.63	-0.019	0.135
1940	0.951	-0.053	-0.21	-0.011
1941	0.077	0.045	0.219	0.161
1942	0.246	0.055	0.224	0.257
1943	-0.216	0.045	0.13	0.263
1944	-0.389	0.031	0.09	0.364
1945	1.057	0.011	-0.071	0.067
1946	0.691	-0.006	0.008	0.325
1947	7.085	0.733	0.833	3.148
1948	0.035	-0.013	0.164	0.396
1949	0.631	0.235	0.319	0.46
1950	0.646	0.007	-0.011	0.171
1951	1.156	0.086	0.016	0.804
1952	0.331	0.172	0.327	0.469
1953	0.482	0.012	0.127	0.705
1954	2.184	0.055	-0.018	0.741
1955	1.677	0.011	0.464	1.506
1956	0.524	0.092	0.398	0.403
1957	0.718	0.057	-0.073	0.446
1958	0.425	0.126	0.235	0.689
1959	6.507	0.417	-0.023	6.75
1960	0.869	-0.024	0.262	1.428
1961	2.112	0.138	0.257	1.702
1962	1.567	-0.004	0.01	0.918
1963	1.945	0.176	0.046	0.711
1964	-0.515	0.036	0.464	0.609
1965	-0.95	-0.014	0.095	0.113
1966	0.321	0.073	0.018	0.041
1967	2.561	0.103	0.208	3.441
1968	0.381	-0.022	-0.147	-0.022
1969	0.601	0.096	0.27	0.756
1970	2.09	-0.062	-0.311	0.349
1971	1.392	0.048	0.118	0.634
1972	0.313	-0.029	-0.124	0.158
1973	0.592	0.148	0.167	0.707
1974	1.544	0.378	0.639	1.471
1975	0.444	0.097	0.265	0.92
1976	2.234	0.448	0.174	2.988
1977	-2.011	-0.416	20.86	-1.012
1978	-0.665	0.009	0.081	0.357
1979	0.418	0.024	0.055	0.26
1980	-0.128	-0.009	0.199	0.576
1981	0.71	0.048	0.421	0.98
1982	0.502	0.007	0.183	0.411
1983	-0.006	0.013	0.03	-0.002
1984	0.426	-0.014	0.272	0.776
1985	-0.194	0.275	0.643	0.611
1986	1.085	-0.016	-0.151	0.024
1987	0.715	0.236	0.088	0.285
1988	1.936	0.17	0.191	2.26
1989	-1.688	-0.096	0.775	1.286
1990	-4.412	0.274	0.053	-20.864
AVERAGE	0.865	0.124	2.471	0.307

Attachment B14

TRINITY RIVER EIS: (MAX FLOW - NO ACTION) - PROSIM (2-5-99) - 2020 LEVEL

SACRAMENTO RIVER SALMON LOSS DIFFERENCE - %

Year	Fall	Late Fall	Winter	Spring
1922	-0.337	1.017	0.735	-0.132
1923	2.473	0.234	0.686	0.116
1924	-0.022	-0.232	79.802	1.473
1925	8.472	1.296	1.515	2.564
1926	9.205	1.28	1.232	2.533
1927	1.61	0.094	-0.112	-0.082
1928	2.117	0.353	0.719	1.21
1929	8.508	0.67	1.144	3.609
1930	6.444	1.084	-1.206	-0.008
1931	-1.676	-0.502	74.777	-0.693
1932	1.628	-0.685	75.379	5.723
1933	-2.527	-1.95	93.626	-0.613
1934	-6.055	-0.147	72.491	-2.424
1935	3.235	1.107	34.282	13.064
1936	-3.652	-0.409	-0.459	-16.24
1937	-16.92	-0.242	0.398	-36.144
1938	4.348	0.333	0.265	2.315
1939	20.025	2.75	0.22	19.523
1940	7.916	0.581	-0.11	0.734
1941	4.022	0.265	0.526	0.879
1942	3.371	0.167	0.281	0.301
1943	1.6	0.168	0.171	0.116
1944	6.85	0.26	0.64	3.056
1945	2.218	0.166	0.229	0.437
1946	0.869	0.177	0.286	0.14
1947	4.541	0.754	1.644	1.056
1948	0.484	-0.006	0.11	0.366
1949	0.16	0.833	1.01	0.587
1950	-0.683	0.288	0.498	0.021
1951	-0.043	0.354	0.24	-0.178
1952	1.202	0.224	0.444	0.149
1953	2.722	0.104	0.311	0.056
1954	3.96	0.196	0.297	1.411
1955	1.03	0.653	1.387	0.968
1956	1.534	0.274	0.833	-0.008
1957	1.125	0.067	0.238	0.043
1958	6.285	0.415	0.714	7.487
1959	4.3	0.695	1.701	1.869
1960	-2.304	0.346	1.595	-0.229
1961	-2.172	0.288	1.605	-0.359
1962	0.433	0.737	1.098	0.157
1963	2.812	0.274	0.008	0.072
1964	6.122	0.278	0.955	1.678
1965	0.428	0.035	0.139	0.032
1966	1.724	0.484	0.579	0.103
1967	3.086	0.111	0.283	1.3
1968	1.759	0.646	2.835	-0.223
1969	0.234	0.205	0.287	-0.026
1970	12.333	0.552	0.763	2.771
1971	1.975	0.132	0.164	-0.203
1972	1.709	0.163	1.998	-0.448
1973	1.01	0.189	0.316	0.427
1974	3.764	0.565	0.683	1.355
1975	2.213	0.262	0.359	0.906
1976	3.404	1.079	0.951	2.02
1977	-5.71	-0.977	73.633	-3.238
1978	-1.348	0.048	0.009	-0.476
1979	0.527	0.417	0.782	0.697
1980	0.136	0.072	0.356	0.69
1981	-0.262	0.208	1.12	0.902
1982	0.176	-0.051	0.239	0.23
1983	8.329	0.39	0.315	5.6
1984	1.267	0	0.881	0.561
1985	0.622	0.628	1.339	0.839
1986	15.757	0.751	-0.197	8.408
1987	21.641	1.484	1.199	40.951
1988	14.032	0.295	-0.752	60.961
1989	-2.34	0.202	1.199	0.89
1990	-10.912	0.432	0.988	-31.449
AVERAGE	2.475	0.332	7.865	1.597

Attachment B14

CVPIA-PEIS: PROSIM 12-9-98 - REVISED NO ACTION (NA3_P27M) - 2020 L

SACRAMENTO RIVER SALMON LOSS SUMMARY - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	4.975	0.209	1.751	3.710
1923	3.357	0.191	3.776	2.706
1924	28.484	1.238	16.179	95.026
1925	4.219	1.043	2.568	3.009
1926	7.476	1.712	7.080	4.242
1927	6.110	0.189	1.135	2.958
1928	3.778	0.426	1.140	2.227
1929	15.804	3.158	1.200	3.852
1930	4.638	0.427	2.961	3.251
1931	34.978	1.757	21.348	98.955
1932	36.347	3.617	4.827	93.815
1933	40.887	3.848	5.039	99.966
1934	35.747	1.941	27.486	99.052
1935	30.206	1.676	4.361	85.262
1936	39.866	5.152	3.217	85.442
1937	25.382	1.273	1.472	39.802
1938	9.502	0.835	1.418	5.751
1939	6.653	0.321	1.337	3.669
1940	4.500	0.899	2.577	3.049
1941	6.288	0.537	0.721	2.204
1942	5.178	0.074	0.788	2.699
1943	5.593	0.314	0.962	2.787
1944	7.397	0.151	0.867	3.309
1945	8.494	0.378	1.096	3.449
1946	3.044	0.216	0.474	1.835
1947	7.062	0.473	1.944	2.917
1948	7.463	0.088	0.632	2.975
1949	2.482	0.616	0.888	1.586
1950	3.765	0.339	0.963	2.401
1951	4.822	0.531	1.125	2.976
1952	5.146	0.106	0.808	3.285
1953	5.943	0.022	0.582	3.817
1954	6.171	0.183	0.486	2.421
1955	5.588	0.474	1.511	3.809
1956	4.159	0.290	1.488	3.076
1957	4.754	0.310	1.485	2.975
1958	15.051	4.125	1.019	5.998
1959	16.189	2.445	3.076	7.453
1960	8.446	0.301	1.491	4.287
1961	8.947	0.178	0.887	4.494
1962	11.306	1.160	1.325	4.729
1963	9.299	1.237	2.258	7.004
1964	7.366	0.156	0.877	3.826
1965	7.066	0.413	3.690	3.376
1966	6.421	0.244	0.954	4.035
1967	12.653	1.375	0.807	5.910
1968	6.646	0.283	1.387	4.816
1969	4.349	0.222	1.079	3.615
1970	4.972	0.547	1.807	4.660
1971	5.547	0.064	0.957	4.164
1972	4.078	0.237	0.964	3.270
1973	3.547	1.013	2.500	3.487
1974	4.789	0.366	1.315	3.159
1975	10.350	0.234	1.074	7.538
1976	18.309	2.879	1.398	9.136
1977	35.953	1.692	26.344	98.969
1978	7.582	0.357	3.053	3.892
1979	5.826	0.573	1.254	3.292
1980	4.760	0.350	1.011	2.294
1981	6.391	0.506	1.281	3.891
1982	2.657	2.052	1.810	2.451
1983	8.642	0.405	0.873	2.287
1984	4.761	0.409	1.608	3.308
1985	3.112	0.276	0.723	2.357
1986	3.860	0.309	2.255	2.844
1987	7.228	0.209	0.695	3.773
1988	17.217	0.709	3.697	7.486
1989	7.678	0.573	1.128	2.956
1990	27.454	1.027	1.485	38.272
AVERAGE	10.793	0.898	2.953	15.323

Attachment B14

TRINITY RIVER EIS: PROSIM 4-2-99 - EXISTING CONDITIONS (TRN_RECD

SACRAMENTO RIVER SALMON LOSS SUMMARY - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	4.914	0.207	1.615	3.590
1923	3.612	0.181	3.424	2.735
1924	28.024	1.263	13.236	93.873
1925	4.389	0.983	2.506	3.187
1926	7.743	1.772	6.865	4.049
1927	6.252	0.185	1.109	2.955
1928	3.669	0.451	1.209	2.481
1929	12.902	2.637	1.483	3.392
1930	4.311	0.311	3.434	3.365
1931	33.989	1.790	12.593	98.620
1932	35.851	3.615	3.625	85.678
1933	39.069	3.707	3.112	97.684
1934	35.610	2.527	17.156	99.068
1935	24.152	1.421	1.777	28.516
1936	28.895	4.151	3.924	14.664
1937	7.498	0.587	1.268	2.805
1938	9.655	0.765	1.294	5.836
1939	5.973	0.397	1.240	3.445
1940	4.395	0.896	2.568	3.106
1941	6.121	0.534	0.726	2.069
1942	5.050	0.070	0.742	2.569
1943	5.643	0.300	0.925	2.744
1944	6.202	0.140	0.856	3.141
1945	8.041	0.355	1.094	3.453
1946	2.897	0.215	0.486	1.840
1947	7.344	0.488	1.700	2.175
1948	7.512	0.087	0.677	2.922
1949	2.531	0.773	1.098	1.694
1950	3.365	0.332	1.001	2.484
1951	4.552	0.566	1.152	2.809
1952	4.966	0.102	0.759	3.112
1953	5.748	0.021	0.549	3.510
1954	5.833	0.192	0.530	2.232
1955	4.891	0.461	1.373	3.265
1956	3.947	0.286	1.449	2.907
1957	4.312	0.316	1.558	2.946
1958	14.919	4.122	0.997	5.722
1959	15.925	2.301	2.861	7.049
1960	7.809	0.379	1.600	3.762
1961	8.403	0.146	0.973	4.690
1962	9.395	1.124	1.422	4.543
1963	8.891	1.237	2.239	6.568
1964	6.664	0.185	0.845	3.137
1965	7.079	0.401	3.656	3.285
1966	6.042	0.234	0.903	3.718
1967	12.532	1.388	0.763	5.609
1968	6.543	0.271	1.284	4.602
1969	4.200	0.210	1.031	3.455
1970	5.065	0.587	1.827	4.651
1971	5.403	0.062	0.897	3.999
1972	3.882	0.220	0.807	2.801
1973	3.420	0.992	2.562	3.372
1974	4.597	0.353	1.269	3.008
1975	10.082	0.224	1.024	7.173
1976	17.089	2.839	1.483	8.100
1977	36.643	1.738	22.893	99.253
1978	7.321	0.355	2.871	3.673
1979	5.863	0.465	1.264	3.183
1980	4.511	0.364	1.005	2.124
1981	5.986	0.357	1.022	3.659
1982	2.594	2.197	1.843	2.397
1983	8.606	0.398	0.841	2.222
1984	4.581	0.422	1.591	3.206
1985	2.557	0.453	0.788	1.948
1986	3.675	0.309	2.287	2.896
1987	6.005	0.184	0.484	2.893
1988	19.577	0.796	3.865	9.801
1989	5.716	0.497	1.205	2.731
1990	20.772	0.849	1.567	12.405
AVERAGE	9.887	0.866	2.494	12.269

Attachment B14

TRINITY RIVER EIS: PROSIM 1-4-99 - REVISED STATE PERMIT (TRN_RSP6)

SACRAMENTO RIVER SALMON LOSS SUMMARY - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	4.799	0.222	1.628	3.815
1923	3.768	0.193	3.802	2.965
1924	25.695	1.066	5.341	72.948
1925	3.423	0.986	2.578	3.238
1926	8.629	1.726	6.668	4.095
1927	3.962	0.175	1.170	2.992
1928	3.654	0.404	1.162	2.463
1929	14.311	2.763	1.114	3.666
1930	5.418	0.330	1.935	3.247
1931	33.554	1.658	11.547	98.012
1932	33.730	3.447	3.249	64.605
1933	40.735	3.767	5.271	99.952
1934	35.568	1.768	28.392	98.975
1935	26.881	1.502	2.409	47.409
1936	32.822	4.216	4.280	37.473
1937	6.518	0.465	1.326	3.282
1938	9.007	0.592	1.141	4.933
1939	10.555	0.736	0.984	3.677
1940	4.170	1.026	2.804	3.242
1941	5.975	0.532	0.575	2.126
1942	4.658	0.065	0.718	2.496
1943	5.112	0.308	0.978	2.965
1944	7.503	0.146	0.790	3.681
1945	7.142	0.362	1.192	3.599
1946	2.967	0.211	0.497	1.971
1947	7.285	0.380	1.640	2.658
1948	7.565	0.079	0.627	3.305
1949	2.998	0.666	0.967	1.798
1950	2.574	0.340	0.996	2.430
1951	5.144	0.450	1.063	3.532
1952	4.543	0.090	0.738	2.882
1953	5.357	0.017	0.509	3.118
1954	5.905	0.177	0.511	2.668
1955	6.832	0.436	1.439	4.318
1956	3.703	0.243	1.103	2.813
1957	4.800	0.306	1.600	3.388
1958	14.602	4.101	1.010	5.361
1959	14.165	1.691	2.913	7.919
1960	7.511	0.222	1.434	4.917
1961	9.269	0.131	1.018	5.358
1962	8.738	1.053	1.443	4.681
1963	8.732	0.550	1.600	6.349
1964	8.836	0.162	0.661	3.904
1965	5.647	0.402	3.603	3.280
1966	6.429	0.232	0.867	4.066
1967	11.964	1.324	0.769	4.994
1968	6.493	0.288	1.392	5.099
1969	3.858	0.134	0.912	3.216
1970	5.320	0.574	1.835	5.041
1971	4.875	0.051	0.891	3.801
1972	4.013	0.244	1.000	3.530
1973	3.892	0.593	2.020	3.742
1974	4.435	0.320	1.241	3.002
1975	9.200	0.195	0.986	6.042
1976	19.249	2.999	1.310	10.910
1977	35.877	1.794	10.995	99.103
1978	6.907	0.360	2.942	4.089
1979	5.622	0.423	1.174	3.483
1980	4.231	0.345	1.013	2.552
1981	6.956	0.521	1.325	4.382
1982	2.211	1.405	1.421	2.162
1983	8.362	0.390	0.873	2.263
1984	5.079	0.413	1.506	3.924
1985	3.618	0.286	0.561	2.023
1986	4.065	0.307	1.899	2.965
1987	6.909	0.193	0.546	3.567
1988	13.104	0.403	3.081	5.407
1989	5.803	0.431	0.999	2.939
1990	25.887	0.951	1.346	29.918
AVERAGE	9.987	0.802	2.309	12.677

Attachment B14

TRINITY RIVER EIS: PROSIM 12-21-98 - REVISED % INFLOW (TRN_RPIA) -

SACRAMENTO RIVER SALMON LOSS SUMMARY - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	4.967	0.242	1.804	3.880
1923	3.584	0.192	3.792	2.858
1924	28.398	1.099	17.898	94.776
1925	3.678	0.957	2.398	3.421
1926	7.369	1.740	7.441	4.877
1927	6.014	0.191	1.276	3.121
1928	4.846	0.538	1.313	2.442
1929	22.070	3.799	1.186	6.436
1930	5.803	0.457	2.136	3.385
1931	34.410	1.669	23.525	98.694
1932	35.850	3.576	4.277	88.655
1933	41.042	3.795	7.022	99.964
1934	35.406	1.812	27.379	98.902
1935	28.877	1.453	3.533	70.778
1936	38.044	4.743	4.083	81.033
1937	21.336	1.070	1.247	15.271
1938	11.059	1.042	1.631	7.391
1939	6.882	0.321	1.351	3.895
1940	5.215	0.875	2.475	3.154
1941	5.889	0.607	1.067	2.193
1942	4.699	0.109	0.956	2.657
1943	5.644	0.362	1.126	3.132
1944	7.789	0.153	0.849	3.534
1945	9.054	0.376	1.057	3.664
1946	3.539	0.210	0.470	2.096
1947	8.582	0.554	2.024	3.656
1948	8.186	0.095	0.694	3.397
1949	2.640	0.614	0.905	1.740
1950	4.330	0.351	0.943	2.461
1951	4.953	0.627	1.169	3.326
1952	4.474	0.253	1.090	3.101
1953	5.254	0.038	0.751	3.122
1954	6.652	0.188	0.480	2.658
1955	6.895	0.483	1.642	4.428
1956	4.257	0.356	2.158	3.370
1957	5.291	0.485	1.698	3.434
1958	14.687	4.134	1.092	5.530
1959	22.105	2.837	3.777	12.402
1960	11.927	0.470	1.554	6.098
1961	12.412	0.366	0.853	6.495
1962	12.736	1.143	1.309	5.525
1963	10.680	1.364	2.329	7.652
1964	7.835	0.167	1.096	4.503
1965	7.135	0.400	3.845	3.610
1966	7.254	0.322	1.016	4.096
1967	14.037	1.482	0.978	7.959
1968	7.293	0.455	3.014	5.435
1969	4.190	0.311	1.286	3.823
1970	6.320	0.669	2.767	5.148
1971	6.826	0.112	1.121	4.926
1972	4.495	0.241	1.264	3.466
1973	3.988	1.167	2.532	4.005
1974	4.661	0.697	1.764	3.419
1975	9.142	0.335	1.288	6.056
1976	26.389	3.707	1.471	20.834
1977	35.859	1.618	29.662	98.900
1978	7.447	0.375	3.234	4.187
1979	6.263	0.598	1.330	3.785
1980	4.897	0.342	1.240	2.929
1981	6.638	0.536	1.356	4.180
1982	3.030	2.056	2.024	2.890
1983	8.379	0.416	0.889	2.267
1984	5.143	0.412	2.567	3.787
1985	3.547	0.306	0.832	2.648
1986	4.585	0.310	2.238	2.886
1987	8.220	0.266	1.062	4.908
1988	21.721	0.982	3.948	12.600
1989	8.554	0.583	1.178	3.669
1990	28.256	1.054	1.740	45.112
AVERAGE	11.444	0.952	3.225	15.371

Attachment B14

TRINITY RIVER EIS: PROSIM 2-5-99 - REVISED MAX FLOW (TRN_RM2K) - :

SACRAMENTO RIVER SALMON LOSS SUMMARY - %

YEAR	FALL	LATE-FALL	WINTER	SPRING
1922	4.638	1.226	2.486	3.578
1923	5.830	0.425	4.462	2.822
1924	28.462	1.006	95.981	96.499
1925	12.691	2.339	4.083	5.573
1926	16.681	2.992	8.312	6.775
1927	7.720	0.283	1.023	2.876
1928	5.895	0.779	1.859	3.437
1929	24.312	3.828	2.344	7.461
1930	11.082	1.511	1.755	3.243
1931	33.302	1.255	96.125	98.262
1932	37.975	2.932	80.206	99.538
1933	38.360	1.898	98.665	99.353
1934	29.692	1.794	99.977	96.628
1935	33.441	2.783	38.643	98.326
1936	36.214	4.743	2.758	69.202
1937	8.462	1.031	1.870	3.658
1938	13.850	1.168	1.683	8.066
1939	26.678	3.071	1.557	23.192
1940	12.416	1.480	2.467	3.783
1941	10.310	0.802	1.247	3.083
1942	8.549	0.241	1.069	3.000
1943	7.193	0.482	1.133	2.903
1944	14.247	0.411	1.507	6.365
1945	10.712	0.544	1.325	3.886
1946	3.913	0.393	0.760	1.975
1947	11.603	1.227	3.588	3.973
1948	7.947	0.082	0.742	3.341
1949	2.642	1.449	1.898	2.173
1950	3.082	0.627	1.461	2.422
1951	4.779	0.885	1.365	2.798
1952	6.348	0.330	1.252	3.434
1953	8.665	0.126	0.893	3.873
1954	10.131	0.379	0.783	3.832
1955	6.618	1.127	2.898	4.777
1956	5.693	0.564	2.321	3.068
1957	5.879	0.377	1.723	3.018
1958	21.336	4.540	1.733	13.485
1959	20.489	3.140	4.777	9.322
1960	6.142	0.647	3.086	4.058
1961	6.775	0.466	2.492	4.135
1962	11.739	1.897	2.423	4.886
1963	12.111	1.511	2.266	7.076
1964	13.488	0.434	1.832	5.504
1965	7.494	0.448	3.829	3.408
1966	8.145	0.728	1.533	4.138
1967	15.739	1.486	1.090	7.210
1968	8.405	0.929	4.222	4.593
1969	4.583	0.427	1.366	3.589
1970	17.305	1.099	2.570	7.431
1971	7.522	0.196	1.121	3.961
1972	5.787	0.400	2.962	2.822
1973	4.557	1.202	2.816	3.914
1974	8.553	0.931	1.998	4.514
1975	12.563	0.496	1.433	8.444
1976	21.713	3.958	2.349	11.156
1977	30.243	0.715	99.977	95.731
1978	6.234	0.405	3.062	3.416
1979	6.353	0.990	2.036	3.989
1980	4.896	0.422	1.367	2.984
1981	6.129	0.714	2.401	4.793
1982	2.833	2.001	2.049	2.681
1983	16.971	0.795	1.188	7.887
1984	6.028	0.409	2.489	3.869
1985	3.734	0.904	2.062	3.196
1986	19.617	1.060	2.058	11.252
1987	28.869	1.693	1.894	44.724
1988	31.249	1.004	2.945	68.447
1989	5.338	0.775	2.327	3.846
1990	16.542	1.459	2.473	6.823
AVERAGE	13.268	1.230	10.818	16.920

2.4.3 Technical Appendix C—Vegetation, Wildlife, and Wetlands Resources

1.1 Vegetation *(SEE SUBSECTIONS)*
1.1.1 Affected Environment *(SEE SUBSECTIONS)*
1.1.1.1 Trinity River Basin *(NO CHANGE)*
1.1.1.2 Lower Klamath River Basin/Coastal Area *(NO CHANGE)*

1.1.1.3 Central Valley **(CHANGES FOLLOW)**
pgs. C-9 and C-10

Tables C-2 and C-3 have been modified to more clearly and accurately define the classifications under the California Native Plant Society. See Section 2.4.3.1 for revised tables.

1.1.2 Environmental Consequences **(CHANGES FOLLOW)**

1.2.2.2 Significance Criteria
pgs. C-31 and C-32

Significance criteria were developed in coordination with the Vegetation and Wildlife Technical Team and with input provided during public scoping meetings. The significance criteria employed for this analysis are based on CEQA and NEPA guidelines. Impacts on wildlife would be significant if project implementation would result in any of the following:

- Potential for reductions in the number, or restrictions of the range, of an endangered or threatened plant species or a plant species that is a candidate for state listing or proposed for federal listing as endangered or threatened
- Potential for substantial reductions in the habitat of any native plant species including those that are listed as endangered or threatened or are candidates (CESA) or proposed (ESA) for endangered or threatened status
- Potential for causing a native plant population to drop below self-sustaining levels
- Potential to eliminate a native plant community
- Substantial adverse effect, either directly or through habitat modifications, on any plant identified as a sensitive or special-status species in local or regional plans, policies, or regulations
- Substantial adverse effect on any riparian habitat or other sensitive natural community identified in local, ~~or~~ regional, or state plans, policies, or regulations
- Substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means
- A conflict with any local policies or ordinances protecting vegetation resources
- A conflict with, or violation of, the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, state, or federal habitat conservation plan relating to the protection of plant resources

1.2 Wildlife *(SEE SUBSECTIONS)*

1.2.1 Affected Environment *(NO CHANGE)*

1.2.2 Environmental Consequences *(SEE SUBSECTIONS))*

1.2.2.4 Maximum Flow **(CHANGES FOLLOW)**

pg. C-33

Bald Eagle. Average Trinity Reservoir June 30 levels were seen to drop by 34 feet on average ~~substantially~~ over the period of record.~~ compared to the No Action Alternative.~~ Shasta Reservoir modeled elevation would decrease by ~~9~~ 7 feet on June 30. Increases in anadromous fish populations anticipated from implementation of this alternative would provide an increased prey base for the bald eagle. This could benefit the local population to the extent that it is currently limited by food availability. Trinity and Shasta Reservoir elevations would decrease slightly on average over the analysis period. This small reduction is not likely to affect the bald eagle food supply, and thus is expected to have minimal effects on the local population.

1.3 Wetlands *(NO CHANGE)*

1.3.1 Affected Environment *(NO CHANGE)*

1.3.2 Environmental Consequences *(NO CHANGE)*

1.3.3 Mitigation *(NO CHANGE)*

1.4 References *(NO CHANGE)*

2.4.3.1 Technical Appendix C—Tables and Figures

Tables

C-1A Vegetation Impacts Compared to the No Action Alternative *(NO CHANGE)*

C-1B Wildlife Impacts Compared to the No Action Alternative *(NO CHANGE)*

C-1C Wetlands Impacts Compared to the No Action Alternative *(NO CHANGE)*

C-2 Special-status Plant Species Occurring or Potentially Occurring in Riparian, Wetland, and Riverine Habitat along the Trinity and Lower Klamath Rivers **(CHANGES FOLLOW)**

C-3 Special-status Plant Species Potentially Occurring in the Central Valley **(CHANGES FOLLOW)**

C-4 Healthy River Attributes and Associated Riparian Characteristics *(NO CHANGE)*

C-5 Special-status Wildlife Species Occurring or Potentially Occurring in Riparian and Riverine Habitat in the Trinity River Basin *(NO CHANGE)*

C-6 Special-status Wildlife Species Occurring or Potentially Occurring in the Central Valley *(NO CHANGE)*

C-7 Attributes of a Healthy Alluvial River System *(NO CHANGE)*

Figures

C-1 Habitat Change Pre-dam versus Post-dam *(NO CHANGE)*

C-2 Idealized Habitat for Special-status Species, Pre-dam and Present Conditions *(NO CHANGE)*

Table C-2
Special-status Plant Species Occurring or Potentially Occurring in Riparian, Wetland, and Riverine Habitat along the Trinity and Lower Klamath Rivers

Common Name	Scientific Name	Status CNPS	Status CA	Status Federal
Rattan's milk-vetch[a]	*Astragalus rattanii* var. *rattanii*	4	—	—
Bottlebrush sedge[a]	*Carex histricina*	2	—	—
Fox sedge	*Carex vulpinoidea*	2	—	—
California lady's-slipper[a]	*Cypripedium californicum*	4	—	—
Clustered lady's-slipper[a]	*Cypripedium fasciculatum*	4	—	FSC
Heckner's lewisia[a]	*Lewisia cotyledon* var. *heckneri*	1B	—	FSC
Showy raillardella[a]	*Raillardella pringlei*	1B	—	FSC
Great burnet[a]	*Sanguisorba officinalis*	2	—	—
English peak greenbriar[a]	*Smilax jamesii*	1B	—	—

[a]Known to occur in the general area of the project.
Status Definitions:
CNPS California Native Plant Society
1B Plants considered rare, threatened, or endangered ~~throughout their range~~ in California and elsewhere
2 Plants considered rare, threatened, or endangered in California, but more common elsewhere
4 Plants of limited distribution
FSC Federal Species of Concern

Table C-3
Special-status Plant Species Potentially Occurring in the Central Valley

Common Name	Scientific Name	Status CNPS	Status CA	Status Federal
Suisun marsh aster	*Aster lentus*	1B	—	FSC
Fox sedge	*Carex vulpinoidea*	2	—	—
Suisun thistle	*Cirsium hydrophilum* var. *hydrophilum*	1B	—	FE
Soft bird's beak	*Cordylanthus mollis* ssp. *mollis*	1B	CR	FE
Silky cryptantha	*Crypthantha crinita*	1B	—	FE
Rose-mallow	*Hibiscus lasiocarpus*	2	—	—
Northern California black walnut	*Juglans californica* var. *hindsii*	1B	—	FSC
Mason's lilaeopsis	*Lilaeopsis masonii*	1B	CR	FSC
Delta mudwort	*Limosella subulata*	2	—	—
Eel-grass pondweed	*Potamogeton zosteriformes*	2	—	—
Sandford's arrowhead	*Sagittaria sanfordii*	1B	—	FSC

Status Definitions:
FE Listed and endangered under federal Endangered Species Act
FSC Federal Species of Concern
CR Considered as rare by the state of California
CNPS California Native Plant Society
1B ~~List 1B species:~~ Plants considered rare, threatened, or endangered in California ~~throughout their range~~ and elsewhere
2 ~~List 2 species:~~ Plants considered rare, threatened, or endangered in California, but more common elsewhere

2.4.4 Technical Appendix D—Recreation Resources

1.1 Riverine *(SEE SUBSECTIONS)*
1.1.1 Affected Environment *(SEE SUBSECTIONS)*

1.1.1.1 Trinity River Basin **(CHANGES FOLLOW)**
pg. D-1

Recreation Resources and Opportunities. Developed recreation areas along the Trinity River consist of private campgrounds, resorts, and lodges; public campgrounds and picnic areas; and fishing access sites. About 34 developed recreation sites are located within a 0.5-mile corridor of the Trinity River. More than 200 access sites were inventoried in 1979 between Lewiston Dam and Weitchpec (U.S. Bureau of Reclamation, 1994). Recreation activities on the Trinity River that are water-dependent or are directly enhanced by the river include boating, kayaking, canoeing, rafting, inner-tubing, fishing, swimming, wading, camping, gold panning, nature study, picnicking, hiking, and sight-seeing. ~~Except for Burnt Ranch Gorge downstream of China Slide, the river is suitable for rafting.~~ Areas upstream of Junction City are best for rafting in spring when flows are high. More than 100 access points for rafting activities are available along the Trinity River. Preferred river reaches for kayaking are the 24-mile reach between the North Fork and Cedar Flat and portions of the river downstream of Willow Creek. The most popular reaches for open canoes are the 5-mile reach from the North Fork to Junction City and the 6-mile reach from the South Fork to Willow Creek. Canoeing on the 8.5-mile reach from the North Fork to Big Bar is generally suitable for special white-water canoes with covered decks (U.S. Bureau of Reclamation, 1994).

pg. D-2

Federal Wild and Scenic River Designation. The entire mainstem Trinity River was designated into the National Wild and Scenic Rivers System in 1981 (46 FR 7484). All rivers designated as either wild, scenic, or recreational by the federal government or the State of California are regarded as having high scenic quality. The reach of the Trinity River downstream from Trinity Reservoir is classified as having distinctive scenic quality and a high scenic quality (U.S. Bureau of Reclamation, 1994). About 13.5 miles of the river were classified as scenic, and about 97.5 miles of the river were classified as recreational. The river is administered by USFS (Six Rivers National Forest and Shasta-Trinity National Forest), BLM, the California Resources Agency, and the Hoopa Valley Indian Reservation (Palmer, 1993). The primary reason for the designation of this river was its anadromous fishery value (U.S. Forest Service, 1995a). The Shasta-Trinity National Forest classifies the Trinity River from Helena downstream to Cedar Flat as recreational, and from Cedar Flat downstream to the river's confluence with New River as scenic (U.S. Forest Service, 1995c). The Six Rivers National Forest classifies the portions of the Trinity River within its jurisdiction as recreational (U.S. Forest Service, 1995a).

1.1.1.2 Lower Klamath River Basin/Coastal Area *(NO CHANGE)*
1.1.1.3 Central Valley *(NO CHANGE)*
1.1.2 Environmental Consequences *(SEE SUBSECTIONS)*

1.1.2.1 Methodology **(CHANGES FOLLOW)**
pg. D-5

In addition to evaluating the effects on recreation opportunities and use and benefits, the project alternatives were evaluated for consistency with Trinity and Humboldt County recreation objectives and State/ Federal Wild and Scenic River designations. Flow-related impacts to riverine recreation opportunities and use within the Central Valley were considered to be negligible because of the minor effect Trinity River District (TRD) changes would have on Sacramento River~~[1]~~ and San Joaquin River flows in regards to recreational opportunities and use. As listed in the Programmatic Environmental Impact Study (PEIS) Technical Appendix, the threshold for boating activities on the Sacramento River are 2,500 to 12,000 cfs. These threshold flow ranges are not exceeded under any of the project alternatives. See Section 3.5, Fishery Resources for impacts to Central Valley sportsfishing. Impacts to recreation opportunities, use and benefits in the Central Valley are not discussed under the alternatives.

Recreation Opportunities Methodology. The mainstem of the Trinity River is the primary focus of the recreational opportunities analysis. Trinity River flows are most influenced by Lewiston releases in the summer months given tributary flow is generally not much of a factor during this period. Many recreational opportunities, in particular white-water (i.e., kayakers and rafters) are most prevalent downstream of the rivers confluence with the North Fork Trinity River. At this location, Lewiston releases play a minor role in Trinity River flows compared to inflows from the North Fork. Impacts to recreational opportunities within the lower Klamath River Basin, aside from sportfishing, are considered to be less than significant because river levels in these areas are minimally influenced by the Lewiston Dam releases. (Impacts to ocean sportfishing are discussed in Section 3.5.4, Ocean Fishery Economics.)

pg. D-6

Recreation Use and Economics Methodology. The methodology for determining recreation use and benefits within the Trinity River Basin and the Lower Klamath River Basin/ Coastal Area is based on river flow and fish population conditions. Annual recreation use relationships were estimated for four activities that occur along the river: boating, swimming, fishing, and hiking and other river-enhanced activities (i.e., off-river activities). The relationship of river flow and fish populations to these activities was generally found to be positive, implying the greater the flow/ fish population, the greater the expected in-river recreation use. Due to model limitations, the recreation use and benefit analyses do not account for species substitution.

1.1.2.2 Significance Criteria **(CHANGES FOLLOW)**
pg. D-9

Table D-2 has been modified to more accurately reflect white-water activities and preferred flow ranges. See Section 2.4.4.1 for revised Table D-2.

~~[1] TRD exports to Sacramento River flows amount to .01 percent of the Sacramento River's volume over the long term.~~

1.1.2.3 No Action Alternative **(CHANGES FOLLOW)**
pgs. D-11 and D-13

Table D-3 has been modified to more accurately reflect white-water conditions. See Section 2.4.4.1 for revised Table D-3.

1.1.2.4 Maximum Flow Alternative **(CHANGES FOLLOW)**

Trinity River Basin.
pg. D-17

White-water activities: The preferred flow range for white-water activities, including kayaking and rafting is ~~300~~450-8,000 cfs. Under the Maximum Flow alternative, white water flows are not constrained during any week of the primary recreation season. All flows on the Trinity River are ~~greater than 300 cfs~~450 cfs or greater, and less than 8,000 cfs during this period for this alternative.

1.1.2.5 Flow Evaluation Alternative **(CHANGES FOLLOW)**

Trinity River Basin.
pg. D-19

White-water activities: The preferred flow range for white-water activities, including kayaking and rafting is ~~300~~450-8,000 cfs. Under the Flow Evaluation Alternative, white-water kayaking and rafting are constrained during the last week of May during the extremely wet water-year class when Trinity River flows exceed the upper preferred threshold of 8,000 cfs. In general, however, those who prefer flows on the higher end of the preferred range would experience improved conditions compared to No Action. ~~Under the Flow Evaluation Alternative, white-water kayaking and rafting are constrained for only one week during the extremely wet water-year class. During this week, flows exceed the 8,000 cfs upper preferred threshold for this activity.~~

1.1.2.6 Preferred Inflow Alternative **(CHANGES FOLLOW)**

Trinity River Basin.
pg. D-21

White-water activities: The preferred flow range for white-water activities, including kayaking and rafting is ~~300~~ 450-8,000 cfs. Under the Percent Flow alternative, white-water kayaking and rafting are constrained for several weeks in each water-year class due to flows less than the ~~300~~ 450 cfs threshold. In extremely wet water years, white water is constrained the last ~~4~~ 6 weeks of the recreation season by low flows. In wet water years, white-water kayaking is constrained the last ~~7~~ 9 weeks of the recreation season due to low flows. In normal water years, white-water kayaking and rafting is constrained the last ~~9~~ 10 weeks of the season due to low flows. In dry water years, white water is constrained the last ~~10~~ 11 weeks of the season, and the last ~~12~~ 14 weeks in extremely dry water years.

1.1.2.7 Mechanical Restoration Alternative *(NO CHANGE)*
1.1.2.8 State Permit Alternative *(NO CHANGE)*
1.1.2.9 Existing Conditions versus Preferred Alternative *(NO CHANGE)*
1.1.3 Mitigation *(NO CHANGE)*

1.2 Reservoirs *(NO CHANGE)*
1.2.1 Affected Environment *(NO CHANGE)*
1.2.1.1 Trinity River Basin *(NO CHANGE)*
1.2.1.2 Central Valley and Lower Klamath Valley/Coastal Areas *(NO CHANGE)*
1.2.2 Environmental Consequences *(SEE SUBSECTIONS)*

1.2.2.1 Methodology **(CHANGES FOLLOW)**
pg. D-29

Table D-6 has been modified to correct Trinity River recreation facility availability data. See Section 2.4.4.1 for revised Table D-6.

1.2.2.2 Significance Criteria *(SEE SUBSECTIONS)*

1.2.2.3 No Action Alternative **(CHANGES FOLLOW)**
pg. D-31

Trinity River Basin. Under the No Action Alternative, use of certain boating facilities, such as the Stuart Fork boat ramps, Fairview ramp, and major marinas would continue to be moderately constrained during the recreation season (Table D-6). Recreation use of Trinity Reservoir is expected to be about ~~796,000~~ 803,600 visitor days in 2020. Annual recreation benefits are estimated to be $~~8.7~~ 8.8 million (Table D-7).

Table D-7 has been modified to more accurately reflect Trinity Reservoir recreation benefits and visitor days under the No Action Alternative. See Section 2.4.4.1 for revised Table D-7.

1.2.2.4 Maximum Flow Alternative **(CHANGES FOLLOW)**
pg. D-31

Trinity River Basin. Under the Maximum Flow Alternative, Trinity Reservoir levels would generally be lower than No Action levels during the recreation season. A number of major recreation facilities would be less available compared to No Action levels (Table D-6). This decrease in facility availability would be a significant impact. Recreation use and benefits of Trinity Reservoir under the Maximum Flow Alternative are estimated to decrease by ~~4~~ 5 percent in average water years but would increase by ~~36~~ 31 percent in dry water years compared to the No Action Alternative (Table D-7). Although the decreases in use and benefits in average water years are adverse, they are considered less than significant.

1.2.2.5 Flow Evaluation Alternative **(CHANGES FOLLOW)**
pg. D-33

Trinity River Basin. Trinity Reservoir water surface elevations would not be significantly below threshold levels for any of the major facilities under this alternative. ~~Recreation facility availability would increase slightly compared to No Action levels~~.

Recreation use and benefits of Trinity Reservoir under the Flow Evaluation Alternative are estimated to ~~increase by 1 percent~~ be essentially the same as under the No Action Alternative in average water years, and to increase by ~~9~~ 5 percent in dry water years compared to the No Action Alternative (Table D-~~6~~8). ~~These~~ The predicted increase~~s~~ in use ~~are~~ in dry years is considered beneficial.

1.2.2.6 Percent Inflow Alternative **(CHANGES FOLLOW)**

Trinity River Basin. Under the Percent Inflow Alternative, Trinity Reservoir levels would drop slightly in summer months compared to No Action levels; resulting in a slight decrease in availability of several of the recreation facilities, including the Stuart Fork Ramp, the Fairview Ramp, and the Trinity Center Ramp. However, no significant decrease in facility availability is anticipated. Recreation use and benefits of Trinity Reservoir under the Percent Inflow Alternative ~~are estimated to increase by 2 percent~~ would be essentially the same as under the No Action Alternative in average water years and would increase by ~~12~~ 9 percent in dry water years compared to the No Action Alternative (Table D-8). This increase in use and benefits in dry water years is considered beneficial.

1.2.2.7 Mechanical Restoration Alternative *(NO CHANGE)*

1.2.2.8 State Permit Alternative **(CHANGES FOLLOW)**
pg. D-34

Trinity River Basin. Under the State Permit Alternative, Trinity Reservoir levels would be slightly higher during the primary recreation season as compared to the No Action Alternative. The availability of recreation facilities would increase compared to No Action levels, except for Minersville Ramp. Recreation use and benefits of Trinity Reservoir under the State Permit Alternative are estimated to increase by ~~6~~ 5 percent in average water years and by ~~5~~ 2 percent in dry water years compared to the No Action Alternative (Table D-8). Because use and benefits in all water years would increase under this alternative relative to the No Action Alternative, this effect is considered beneficial.

1.2.2.9 Existing Conditions versus Preferred Alternative

Table D-8 has been modified to more accurately reflect Trinity Reservoir recreation benefits and visitor days under the No Action Alternative. See Section 2.4.4.1 for revised Table D-8.

1.2.3 Mitigation *(NO CHANGE)*

1.3 ~~Riverine~~ References

2.4.4.1 Technical Appendix D—Tables

Tables

D-1 Results of Travel Cost Model Regressions for the Trinity River *(NO CHANGE)*

D-2 Preferred Recreation Flow Ranges/ Thresholds **(CHANGES FOLLOW)**

D-3 Riverine Recreation Opportunities **(CHANGES FOLLOW)**

D-4 Impacts to Riverine Recreation Use and Benefits – Dry Water Conditions *(NO CHANGE)*

D-5 Trinity Reservoir Elevations at which Facility Operations are Adversely Affected *(NO CHANGE)*

D-6 Impacts to Trinity and Shasta Reservoir Recreation Opportunities **(CHANGES FOLLOW)**

D-7 Impacts to Reservoir Use and Benefits **(CHANGES FOLLOW)**

D-8 Trinity, Shasta, and Folsom Reservoir Recreation Opportunities, Use and Benefits **(CHANGES FOLLOW)**

TABLE D-2
Preferred Recreation Flow Ranges/Thresholds[a]

Activity	Preferred Flow Ranges (cfs)
Canoeing	200-1,500
Drift-boat and drift-raft fishing	200-1,500
White-water activities (i.e., kayaking, canoeing, and rafting)	~~300~~ 450-8,000
Recreational mining	350-600
Shore fishing	300-800
Swimming/inner-tubing	150-800
Wading	300-800
Campground Use Precluded	**Flow Threshold**
Steel Bridge, Douglas City	8,000 or greater
Steiner Flat, North Fork	10,000 or greater
Poker Bar	12,000 or greater

[a] Trinity River flows in the Preferred Flow/Threshold range during the primary recreation season (Memorial Day to Labor Day) as measured at the Lewiston gage.

TABLE D-3
Riverine Recreation Opportunities – Trinity River

		Recreation Opportunity Constraints During the Primary Recreation Season[a, b]					
Resource Concern	**Preferred Flow Range (cfs)**	**No Action/Existing Conditions**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**
Canoeing	200-1,500	No constraint[c]	Constrained 8 weeks in **extremely wet** and **wet** years. Constrained 6 weeks in **normal** and **dry** years. Constrained 5 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet** years and **normal** years. Constrained 1 week in **dry** years. Not constrained during **critically dry** years.	Constrained 8 weeks in **extremely wet**, **wet**, **normal**, and **dry** years. Constrained 10 weeks in **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Camping							
Steel Bridge, Douglas City	8,000 or less	No constraint	No constraint	Constrained 1 week in **extremely wet** years.	No constraint	No constraint	No constraint
Steiner Flat, North Fork	10,000 or less	No constraint	No constraint	No constraint	No constraint	No constraint	No constraint
Poker Bar	12,000 or less	No constraint	No constraint	No constraint	No constraint	No constraint	No constraint
Drift-boat fishing	300-1,500	No constraint	Constrained 8 weeks in **extremely wet** and **wet** years. Constrained 6 weeks in **normal** and **dry** years. Constrained 5 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet** and **normal** years. Constrained 1 week in **dry** years. Not constrained during **critically dry** years.	Constrained 9 weeks in **extremely wet**, **wet** and **normal** years. Constrained 10 weeks during **dry** years. Constrained 12 weeks during **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Drift-raft fishing	200-1,500	No constraint	Constrained 8 weeks in **extremely wet** and **wet** years. Constrained 6 weeks in **normal** and **dry** years. Constrained 5 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet** and **normal** years. Constrained 1 week in **dry** years. Not constrained during **critically dry** years.	Constrained 8 weeks in **extremely wet**, **wet, normal,** and **dry** years. Constrained 10 weeks in **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
White-water (i.e., kayaking, canoeing, and rafting)	~~300~~450-8,000	No constraint	No constraint	Constrained 1 week in extremely **wet** years.[d] Not constrained in wet, normal, dry, and critically dry years.	Constrained ~~4~~ 6 weeks in **extremely wet** years. Constrained ~~7~~ 9 weeks in **wet** years. Constrained ~~9~~ 10 weeks in **normal** years. Constrained ~~10~~ 11 weeks in **dry** years. Constrained ~~12~~ 14 weeks in **critically dry** years.	No constraint	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Recreational mining	350-600	Constrained 3 weeks in **all** water-year classes.	Constrained 10 weeks in **extremely wet** years. Constrained 15 weeks (entire recreation season) in **wet, normal, dry,** and **critically dry** years.	Constrained 8 weeks in **extremely wet**, **wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 13 weeks in **extremely wet**, **wet**, **dry**, and **critically dry** years. Constrained 14 weeks in **normal** years.	Constrained 3 weeks in **all** water-year classes.	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Swimming/inner-tubing	150-800	Constrained 2 weeks in **all** water-year classes.	Constrained 9 weeks in **extremely wet** years. Constrained 11 weeks in **wet** years. Constrained 8 weeks in **normal** and **dry** years. Constrained 15 weeks (entire recreation season) in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 9 weeks in **extremely wet** years and **dry** years. Constrained 10 weeks in **wet, normal** and **critically dry** years.	Constrained 2 weeks in **all** water-year classes.	No constraint

TABLE D-3
Riverine Recreation Opportunities – Trinity River

		Recreation Opportunity Constraints During the Primary Recreation Season[a, b]					
Resource Concern	**Preferred Flow Range (cfs)**	**No Action/Existing Conditions**	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**
Shore fishing	300-800	Constrained 2 weeks in **all** water-year classes.	Constrained 9 weeks in **extremely wet** years. Constrained 11 weeks in **wet** years. Constrained 8 weeks in **normal** and **dry** years. Constrained 15 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 12 weeks in **all** water-year classes.	Constrained 2 weeks in **all** water-year classes.	Constrained 15 weeks (the entire primary recreation season) in **all** water-year classes.
Wading	300-800	Constrained 2 weeks in **all** water-year classes.	Constrained 9 weeks in **extremely wet** years. Constrained 11 weeks in **wet** years. Constrained 8 weeks in **normal** and **dry** years. Constrained 15 weeks in **critically dry** years.	Constrained 7 weeks in **extremely wet**, **wet**, and **normal** years. Constrained 3 weeks in **dry** and **critically dry** years.	Constrained 12 weeks in **all** water-year classes.	Constrained 2 weeks in **all** water-year classes.	Constrained 15 weeks (the entire primary recreation season) in all water-year classes.

[a]See Recreation Resources Technical Appendix D for more specific information about weekly flows impacts to recreation opportunities.

[b]The primary recreation season is defined as Memorial Day to Labor Day (approximately the last week in May to the end of the first week in September).

[c]Flows within preferred range during the entire primary recreation season for all year classes.

[d]White-water kayaking and rafting are constrained during the last week of May during the extremely wet water-year class when the Trinity River flows exceed the upper preferred threshold of 8,000 cfs. In general, however, those who prefer flows on the higher end of the preferred range would experience improved conditions compared to No Action.

TABLE D-6
Impacts to Trinity and Shasta Reservoir Recreation Opportunities

	Projected Recreation Facility Availability During the Recreation Season[a]						
	No Action	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions
Facility and Threshold Elevation (msl)	Facility Availability (percent)						
Trinity Reservoir							
Stuart Fork Ramps (2,320)	~~42~~ 45	9	42	41	42	56	46
Fairview Ramp & Major Marina Relocations Required (2,310)	~~52~~ 54	18	52	50	52	62	55
Trinity Center Ramp (2,295)	~~62~~ 63	35	63	59	62	72	63
Campground Use (2,270)	~~74~~ 78	64	79	80	74	84	80
Minersville Ramp (2,170)	~~99~~ 100	99	100	100	99	100	100
Shasta Reservoir							
McCloud Arm Ramps (952)	92	89	90	90	92	92	93
Sacramento Arm Ramps (950)	92	89	91	92	92	92	94
Sacramento Arm Marina (937)	93	89	93	94	93	94	95
Pit Arm Ramps (907)	98	93	96	98	98	99	98
Centimudi Ramp (844)	100	97	100	100	100	100	100
Folsom Reservoir							
Last boat ramp out of operation (360)	98	99	98	98	98	98	99
Limited lake surface area (boating constrained at 400)	87	89	83	86	87	89	89
Marina closes (405)	80	82	76	79	80	83	82
Decline in campground/picnicking use (430)	56	56	53	54	56	55	56
Beach area inundated (450)	31	32	30	30	31	31	32

TABLE D-7
Impacts to Reservoir Use and Benefits[a]

	No Action	Maximum Flow		Flow Evaluation		Percent Inflow		Mechanical Restoration	State Permit		Existing Conditions[b]	
Resource Concern		**Amount**	**Percent Change from No Action**	**Amount**	**Percent Change from No Action**	**Amount**	**Percent Change from No Action**		**Amount**	**Percent Change from No Action**	**Amount**	**Preferred Alternative Percent Change from Existing Conditions**
Trinity Reservoir												
Recreation Benefits (million $)	~~8.7~~ 8.8	8.4	~~-4~~ -5	~~8.7~~ 8.8	~~1~~ 0	8.8	~~2~~ 1	Same as No Action	9.2	~~6~~ 5	5.3	66
Visitor Days	~~796,200~~ 803,600	766,200	~~-4~~ -5	802,800	~~1~~ 0	809,700	~~2~~ 1	Same as No Action	841,000	~~6~~ 5	484,900	66
Shasta Reservoir												
Recreation Benefits (million $)	61.9	56.9	-8	60.9	-2	61.8	0	Same as No Action	63.1	2	38.0	60
Visitor Days	5,682,700	5,216,500	-8	5,583,400	-2	5,673,600	0	Same as No Action	5,786,800	2	3,483,100	60

[a] Long-term average water conditions only.
[b] 1995 existing conditions.

Notes:
Impacts shown for long-term average water conditions only. See Table D-8 ~~Recreational Technical Appendix D~~ for dry water conditions.
All benefits are expressed in 1997 dollars.

TABLE D-8
~~Trinity, Shasta, and Folsom~~ Reservoir Recreation Opportunities, Use and Benefits[a]

Recreation Facility Availability During the Recreation Season	Existing Conditions	No Action	Maximum Flow		Flow Evaluation		Percent Inflow		Mechanical Restoration		State Permit	
	Facility Availability (Percentage)	Facility Availability (Percentage)	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action	Facility Availability (Percentage)	Percent Change from No Action
Trinity Reservoir												
Stuart Fork Ramps (2,320 msl)	46	~~42~~ 45	9	~~-33~~ -36	42	~~0~~ -3	41	~~-1~~ -4	~~42~~ 45	0	56	~~14~~ 11
Fairview Ramp & major marina relocations (2,310 msl)	55	~~52~~ 54	18	~~-34~~ -36	52	~~0~~ -2	50	~~-2~~ -4	~~52~~ 54	0	62	~~10~~ 8
Trinity Center Ramp (2,295 msl)	63	~~62~~ 63	35	~~-27~~ -28	63	~~1~~ 0	59	~~-3~~ -4	~~62~~ 63	0	72	~~10~~ 9
Campground Use (2,270 msl)	80	~~74~~ 78	64	~~-10~~ -14	79	~~5~~ 1	80	~~6~~ 2	~~74~~ 78	0	84	~~10~~ 6
Minersville Ramp (2,170 msl)	100	~~99~~ 100	99	~~0~~ -1	100	~~1~~ 0	100	~~1~~ 0	~~99~~ 100	0	100	~~1~~ 0
Shasta Reservoir												
McCloud Arm Ramps (952 msl)	93	92	89	-3	90	-2	90	-2	92	0	92	0
Sacramento Arm Ramps (950 msl)	94	92	89	-3	91	-1	92	0	92	0	92	0
Sacramento Arm Marina (937 msl)	95	93	89	-4	93	0	94	1	93	0	94	1
Pit Arm Ramps (907 msl)	98	98	93	-5	96	-2	98	0	98	0	99	1
Centimudi Ramp (844 msl)	100	100	97	-3	100	0	100	0	100	0	100	0
Folsom Reservoir												
Last boat ramp out of operation (360 msl)	99	98	95	-3	98	0	98	0	98	0	98	0
Limited lake surface area (boating constrained at 400 msl)	89	87	77	-10	83	-4	86	-1	87	0	89	2
Marina closes (405 msl)	82	80	72	-8	76	-4	79	-1	80	0	83	3
Decline in campground/picnicking use (430 msl)	56	56	53	-3	53	-3	54	-2	56	0	55	-1
Beach area inundated (450 msl)	32	31	29	-2	30	-1	30	-1	31	0	31	0
Oroville Reservoir												
Decline in campground/picnicking use (700 msl)	94	91	92	1	91	0	91	0	91	0	91	0
Limited boat ramp availability and relocation of marina (710 msl)	92	89	90	1	90	1	90	1	89	0	89	0
Limited lake surface area/boating constrained (750 msl)	84	79	82	3	80	1	79	0	79	0	81	2
Beach area closed (819 msl)	63	53	51	2	52	-1	52	0	53	0	54	1
Decline in beach use (840 msl)	55	45	43	-2	45	0	45	0	45	0	47	2
San Luis Reservoir												
340 msl – Last boat ramp out of operation	98	99	100	1	98	-1	100	1	99	0	99	0
360 msl – Limited lake surface/decline in campground use	87	91	92	1	90	-1	91	0	91	0	92	1
Whiskeytown Reservoir												
1198 msl	100	100	100	0	100	0	100	0?	100	0	100	0
1195 msl	100	100	100	0	100	0	100	0	100	0	100	0
1190 msl	100	100	100	0	100	0	100	0	100	0	100	0

Estimated Annual Recreation Use and Change in Benefits Compared to No Action	Existing Conditions	No Action	Maximum Flow		Flow Evaluation			Percent Inflow		Mechanical Restoration		State Permit	
	Amount	Amount	Amount	Percent Change from No Action	Amount	Percent Change from No Action	Percent Change from Existing Conditions	Amount	Percent Change from No Action	Amount	Percent Change from No Action	Amount	Percent Change from No Action
Trinity Reservoir Benefits—Average Water-year Conditions													
Recreations Benefits (million $)	5.3	~~8.7~~ 8.8	8.4	~~-4~~ -5	8.8	~~66~~ 0	66	8.8	~~2~~ 1	~~8.7~~ 8.8	0	9.2	~~6~~ 5
Visitor Days[~~e~~b]	484,900	~~796,200~~ 803,600	766,200	~~-4~~ -5	802,800	~~66~~ 0	66	809,700	~~2~~ 1	~~796,200~~ 803,600	0	841,000	~~6~~ 5

TABLE D-8
~~Trinity, Shasta, and Folsom~~ Reservoir Recreation Opportunities, Use and Benefits[a]

Estimated Annual Recreation Use and Change in Benefits Compared to No Action													
	Existing Conditions	No Action	Maximum Flow		Flow Evaluation			Percent Inflow		Mechanical Restoration		State Permit	
	Amount	Amount	Amount	Percent Change from No Action	Amount	Percent Change from No Action	Percent Change from Existing Conditions	Amount	Percent Change from No Action	Amount	Percent Change from No Action	Amount	Percent Change from No Action
Shasta Reservoir Benefits—Average Water-year Conditions													
Recreations Benefits (million $)	38.0	61.9	56.9	-8	60.4	~~60~~ -2	60	61.8	0	61.9	0	63.1	2
Visitor Days[~~c~~b]	3,483,100	5,682,700	5,216,500	-8	5,583,400	~~60~~ -2	60	5,673,600	0	5,682,700	0	5,786,800	2
Trinity Reservoir – Dry water-year conditions													
Recreations Benefits (million $)	3.8	~~6.0~~ 6.3	8.2	~~36~~ 31	6.6	~~9~~ 5	75	6.8	~~13~~ 9	~~6.0~~ 6.3	0	6.4	~~5~~ 1
Visitor Days[~~c~~b]	346,500	~~555,300~~ 574,700	752,800	~~36~~ 31	604,900	~~9~~ 5	75	625,000	~~13~~ 9	~~555,300~~ 574,700	0	585,000	~~5~~ 2
Shasta Reservoir – Dry water-year conditions													
Recreations Benefits (million $)	28	44.6	30.7	-31	41.9	-6	50	44.3	-1	44.6	0	45.3	2
Visitor Days[~~c~~b]	2,567,800	4,090,300	2,812,800	-31	3,841,600	-6	50	4,064,200	-1	4,090,300	0	4,159,400	2

[a] Estimated annual recreation use and change in benefits were identified for only Trinity and Shasta Reservoirs given they were assumed to be the reservoirs most directly affected by the change in Trinity and Shasta Division operations.
~~[b] Long-term average water conditions.~~
[~~c~~b] Number of recreation visitor days (RVD).

2.4.4.2 Technical Appendix D—Attachments

D1 Recreation Technical Appendix – Attachment A *(NO CHANGE)*

D2 Trinity River Average Weekly Flow Data **(CHANGES FOLLOW)**

Trinity River average weekly flow data for whitewater (query 300-8,000 cfs threshold) has been replaced with data for 450-8,000 cfs threshold (pg. 8).

D3 Recreation Use and Economics Data **(CHANGES FOLLOW)**

Table REC-3 has been modified to more accurately present Trinity Lake data (pg. 5).

D4 Reservoir Data for Recreation Opportunities Analysis

TRINITY RESERVOIR DATA **(CHANGES FOLLOW)**

Trinity Reservoir 2320 msl Recreation Activity Threshold

Page 1, No Action data, has been replaced with data based on revised elevation levels.

Trinity Reservoir 2310 msl Recreation Activity Threshold

Page 1, No Action data, has been replaced with data based on revised elevation levels.

Trinity Reservoir 2295 msl Recreation Activity Threshold

Page 1, No Action data, has been replaced with data based on revised elevation levels.

Trinity Reservoir 2270 msl Recreation Activity Threshold

Page 1, No Action data, has been replaced with data based on revised elevation levels.

Trinity Reservoir 2170 msl Recreation Activity Threshold

Page 1, No Action data, has been replaced with data based on revised elevation levels.

SHASTA RESERVOIR DATA *(NO CHANGE)*

Shasta Reservoir 952 msl Recreation Activity Threshold

Shasta Reservoir 950 msl Recreation Activity Threshold

Shasta Reservoir 937 msl Recreation Activity Threshold

Shasta Reservoir 907 msl Recreation Activity Threshold

Shasta Reservoir 844 msl Recreation Activity Threshold

FOLSOM RESERVOIR DATA *(NO CHANGE)*

Folsom Reservoir 450 msl Recreation Activity Threshold

Folsom Reservoir 430 msl Recreation Activity Threshold

Folsom Reservoir 405 msl Recreation Activity Threshold

Folsom Reservoir 400 msl Recreation Activity Threshold

Folsom Reservoir 360 msl Recreation Activity Threshold

WHISKEYTOWN RESERVOIR DATA **(CHANGES FOLLOW)**

Whiskeytown Reservoir 1198 msl Recreation Activity Threshold

Page 6, Existing Conditions data, has been replaced with data based on revised elevation levels.

Whiskeytown Reservoir 1195 msl Recreation Activity Threshold

Page 6, Existing Conditions data, has been replaced with data based on revised elevation levels.

Whiskeytown Reservoir 1190 msl Recreation Activity Threshold

Page 6, Existing Conditions data, has been replaced with data based on revised elevation levels.

OROVILLE RESERVOIR DATA *(NO CHANGE)*

Oroville Reservoir 840 msl Recreation Activity Threshold

Oroville Reservoir 819 msl Recreation Activity Threshold

Oroville Reservoir 750 msl Recreation Activity Threshold

Oroville Reservoir 710 msl Recreation Activity Threshold

Oroville Reservoir 700 msl Recreation Activity Threshold

SAN LUIS RESERVOIR DATA *(NO CHANGE)*

San Luis Reservoir 360 msl Recreation Activity Threshold

San Luis Reservoir 340 msl Recreation Activity Threshold

Attachment D2 Average Weekly Flow Data (cfs) Used for Recreation Opportunities Analysis - Proposed Trinity River Mainstem Fishery Restoration EIS/EIR Flow Alternatives

Totals for Whitewater Query (Preferred Threshold = 450-8,000 cfs)

	No Action/ Existing Conditions	Maximum Flow Alternative Refined					Flow Evaluation Alternative Refined					Percent Inflow Alternative					State Permit Alternative
		Ex. Wet	Wet	Normal	Dry	Crit. Dry	Ex. Wet	Wet	Normal	Dry	Crit. Dry	Ex. Wet	Wet	Normal	Dry	Crit. Dry	
30-Sep	450	300	300	300	300	300	450	450	450	450	450	111	82	70	54	61	200
7-Oct	450	300	300	300	300	300	450	450	450	450	450	111	75	77	69	88	200
14-Oct	328	300	300	300	300	300	321	321	321	321	321	271	200	82	86	75	200
21-Oct	300	300	300	300	300	300	300	300	300	300	300	177	126	129	78	70	200
28-Oct	300	300	300	300	300	300	300	300	300	300	300	429	149	93	158	65	200
4-Nov	300	300	300	300	300	300	300	300	300	300	300	266	366	134	122	116	250
11-Nov	300	300	300	300	300	300	300	300	300	300	300	982	289	194	169	127	250
18-Nov	300	300	300	300	300	300	300	300	300	300	300	1845	375	291	312	122	250
25-Nov	300	300	300	300	300	300	300	300	300	300	300	1055	590	275	230	99	250
2-Dec	300	300	300	300	300	300	300	300	300	300	300	937	726	284	232	111	200
9-Dec	300	300	300	300	300	300	300	300	300	300	300	593	868	263	383	171	200
16-Dec	300	300	300	300	300	300	300	300	300	300	300	1410	900	227	358	187	200
23-Dec	300	300	300	300	300	300	300	300	300	300	300	1661	1595	324	268	118	200
30-Dec	300	3000	300	300	300	300	300	300	300	300	300	1238	1019	311	241	125	200
6-Jan	300	3000	3000	3000	300	300	300	300	300	300	300	826	820	313	256	142	150
13-Jan	300	3000	3000	3000	300	300	300	300	300	300	300	1064	859	770	273	149	150
20-Jan	300	3000	3000	3000	300	300	300	300	300	300	300	3123	1307	634	271	140	150
27-Jan	300	3000	3000	3000	1900	300	300	300	300	300	300	1421	1345	558	384	169	150
3-Feb	300	3000	3000	3000	1950	300	300	300	300	300	300	1231	1316	635	314	212	150
10-Feb	300	3000	3000	3000	2000	300	300	300	300	300	300	1666	1454	835	519	408	150
17-Feb	300	3000	3000	3000	2000	300	300	300	300	300	300	1872	1469	738	617	246	150
24-Feb	300	3000	3000	3000	2000	300	300	300	300	300	300	2132	1349	1110	513	245	150
3-Mar	300	3000	3000	3000	2000	300	300	300	300	300	300	2456	1401	1120	565	210	150
10-Mar	300	3000	3000	3000	2000	300	300	300	300	300	300	1788	1156	1311	763	381	150
17-Mar	300	3000	3000	3000	2000	300	300	300	300	300	300	1660	1038	1296	792	429	150
24-Mar	300	3000	3000	3000	2000	300	300	300	300	300	300	1582	1018	1156	770	567	150
31-Mar	300	3000	3000	3000	2000	300	300	300	300	300	300	2087	1429	1306	880	491	150
7-Apr	300	4441	3631	3000	2100	300	300	300	300	300	300	1982	1393	1406	1085	565	150
14-Apr	300	5882	4262	3000	2500	300	300	300	300	300	300	1788	1635	1563	1235	542	150
21-Apr	300	7323	4893	3000	2900	300	500	500	500	557	1243	1949	1873	1740	1282	518	150
28-Apr	300	8764	5524	4215	3800	300	1500	2000	2500	4071	1500	2202	2068	1551	1266	578	150
5-May	1714	10205	6155	5429	2500	300	2000	2500	5683	3788	1500	2613	1994	1569	1306	696	150
12-May	2000	11643	6786	4000	2300	1250	2000	5857	5006	2783	1500	2968	2287	1613	1234	608	150
19-May	1700	27857	6429	2714	2100	2000	7786	7071	3867	2045	1500	3164	2476	1555	1198	562	150
PRIMARY RECREATION SEASON FLOWS:																	
26-May	1086	7929	4286	2300	2000	2000	9810 [2]	5285	2988	1503	1445	3745	2335	1241	1051	574	150
2-Jun	1000	5000	3714	2000	2000	2000	6476	3362	2309	1104	1104	3394	1813	1200	969	392	150
9-Jun	628	4286	2714	2000	2000	2000	5104	2179	2000	811	811	2805	1414	1041	723	303	150
16-Jun	450	2643	2400	2000	2000	2000	3464	2000	2000	596	596	2257	1088	745	573	267	150
23-Jun	450	2000	2000	2000	2000	2000	2355	2000	2000	461	461	1751	857	488	416	273	150
30-Jun	450	2000	2000	2000	2000	900	2000	2000	2000	450	450	1400	593	342	285	146	150
7-Jul	450	2000	2000	1500	1500	900	1543	1543	1543	450	450	1116	430	248	202	99	150
14-Jul	450	1700	1800	1200	1100	900	696	696	696	450	450	818	313	189	150	73	150
21-Jul	450	1200	1000	800	700	900	450	450	450	450	450	579	237	147	118	61	150
28-Jul	450	629	900	650	700	900	450	450	450	450	450	443	181	115	93	51	150
4-Aug	450	450	900	650	700	900	450	450	450	450	450	312	145	96	83	42	150
11-Aug	450	450	800	650	700	900	450	450	450	450	450	233	118	84	72	38	150
18-Aug	450	450	670	650	700	900	450	450	450	450	450	187	102	75	65	34	150
25-Aug	450	450	650	650	700	900	450	450	450	450	450	172	93	70	58	33	150
1-Sep	450	450	650	650	700	900	450	450	450	450	450	148	97	64	55	33	150
8-Sep	450	300	650	650	700	900	450	450	450	450	450	150	84	58	52	30	150
15-Sep	450	300	300	300	300	300	450	450	450	450	450	168	81	55	50	29	150
22-Sep	450	300	300	300	300	300	450	450	450	450	450	116	92	73	50	50	150
# Weeks Out of Preferred	0	0	0	0	0	0	1	0	0	0	0	6	9	10	11	14	15
# Weeks In Preferred Range	15	15	15	15	15	15	14	15	15	15	15	9	6	5	4	1	0

[1] Average weekly flows are shown for the entire year. However, whitewater flows are only evaluated in the DEIS/EIR for the Primary Recreation Season because this is the period in which Lewiston releases play the greatest role in Trinity River flows. Tributary in-flows play a much greater role in Trinity River Flows during the remainder of the year.

[2] Whitewater kayaking and rafting are constrained during the last week of May during the extremely wet water-year class when the Trinity River flows exceed the upper preferred threshold of 8,000 cfs for white-water activities. In general, however, those who prefer flows on the higher end of the preferred range would experience improved conditions compared to No Action.

Attachment D3

Table REC-3. Estimated Visitor Days and Recreation Benefits at Lake Shasta and Trinity Lake, by Alternative (Average and Dry Water Year Conditions)

AVERAGE WATER-YEAR CONDITIONS

NEPA Analysis	No Action Alternative Visitor Days	Benefits	Maximum Flow Visitor Days	Benefits	Flow Study Visitor Days	Benefits	Percent Inflow Visitor Days	Benefits	Mech. Restoration Visitor Days	Benefits	State Permit Visitor Days	Benefits
Lake Shasta	5,682,700	$61,941,430	5,216,500	$56,859,850	5,583,400	$60,859,060	5,673,600	$61,842,240	5,682,700	$61,941,430	5,786,800	$63,076,120
Net change /a			-466,200	-$5,081,580	-99,300	-$1,082,370	-9,100	-$99,190	0	$0	104,100	$1,134,690
Percent change/a			-8%	-8%	-2%	-2%	0%	0%	0%	0%	2%	2%
Trinity Lake	803,600	$8,759,240	766,200	$8,351,580	802,800	$8,750,520	809,700	$8,825,730	803,600	$8,759,240	841,000	$9,166,900
Net change/a			-37,400	-$407,660	-800	-$8,720	6,100	$66,490	0	$0	37,400	$407,660
Percent change/a			-5%	-5%	0%	0%	1%	1%	0%	0%	5%	5%

CEQA Analysis	1995 Existing Conditions Visitor Days	Benefits	Preferred Alternative Visitor Days	Benefits
Lake Shasta	3,483,100	$37,965,790	5,583,400	$60,859,060
Net change/b			2,100,300	$22,893,270
Percent change/b			60%	60%
Trinity Lake	484,900	$5,285,410	802,800	$8,750,520
Net change/b			317,900	$3,465,110
Percent change/b			66%	66%

DRY WATER-YEAR CONDITIONS

NEPA Analysis	No Action Alternative Visitor Days	Benefits	Maximum Flow Visitor Days	Benefits	Flow Study Visitor Days	Benefits	Percent Inflow Visitor Days	Benefits	Mech. Restoration Visitor Days	Benefits	State Permit Visitor Days	Benefits
Lake Shasta	4,090,300	$44,584,270	2,812,800	$30,659,520	3,841,600	$41,873,440	4,064,200	$44,299,780	4,090,300	$44,584,270	4,159,400	$45,337,460
Net change /a			-1,277,500	-$13,924,750	-248,700	-$2,710,830	-26,100	-$284,490	0	$0	69,100	$753,190
Percent change/a			-31%	-31%	-6%	-6%	-1%	-1%	0%	0%	2%	2%
Trinity Lake	574,700	$6,264,230	752,800	$8,205,520	604,900	$6,593,410	625,000	$6,812,500	574,700	$6,264,230	585,000	$6,376,500
Net change/a			178,100	$1,941,290	30,200	$329,180	50,300	$548,270	0	$0	10,300	$112,270
Percent change/a			31%	31%	5%	5%	9%	9%	0%	0%	2%	2%

CEQA Analysis	1995 Existing Conditions Visitor Days	Benefits	Preferred Alternative Visitor Days	Benefits
Lake Shasta	2,567,800	$27,989,020	3,841,600	$41,873,440
Net change/b			1,273,800	$13,884,420
Percent change/b			50%	50%
Trinity Lake	346,500	$3,776,850	604,900	$6,593,410
Net change/b			258,400	$2,816,560
Percent change/b			75%	75%

Notes:
All benefits are expressed in 1997 dollars.
Benefits were estimated based on an average value of $10.90 per recreation visitor day as derived from a study of recreation benefits at Lake Isabella in Califonia Loomis 1995).
a/ Change as compared to levels under the No Action Alternative.
b/ Change as compared to levels under the 1995 Existing Conditions.

Attachment D4

Trinity Elevation (ft)
No Action

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Stuart Forks Ramp threshold of 2320 msl?

Year	MAY	JUN	JUL	AUG	SEP	**Months**	**% of Season**
1922	2344	2345	2334	2327	2320	1	20%
1923	2327	2314	2296	2275	2272	4	80%
1924	2228	2219	2211	2190	2182	5	100%
1925	2299	2300	2289	2284	2282	5	100%
1926	2311	2294	2273	2248	2243	5	100%
1927	2349	2351	2342	2336	2329	0	0%
1928	2357	2344	2329	2312	2299	2	40%
1929	2286	2271	2256	2248	2241	5	100%
1930	2279	2270	2255	2249	2244	5	100%
1931	2235	2219	2209	2184	2178	5	100%
1932	2230	2208	2184	2179	2173	5	100%
1933	2224	2228	2218	2192	2184	5	100%
1934	2238	2220	2202	2184	2179	5	100%
1935	2255	2245	2239	2232	2217	5	100%
1936	2261	2258	2244	2238	2231	5	100%
1937	2269	2270	2257	2252	2246	5	100%
1938	2364	2369	2358	2351	2339	0	0%
1939	2316	2300	2279	2255	2251	5	100%
1940	2336	2326	2311	2292	2285	3	60%
1941	2368	2369	2358	2351	2339	0	0%
1942	2368	2369	2358	2351	2338	0	0%
1943	2360	2355	2344	2338	2329	0	0%
1944	2322	2309	2292	2270	2264	4	80%
1945	2310	2314	2303	2285	2274	5	100%
1946	2332	2323	2311	2292	2287	3	60%
1947	2296	2288	2266	2241	2236	5	100%
1948	2296	2310	2301	2294	2291	5	100%
1949	2335	2325	2309	2290	2286	3	60%
1950	2311	2303	2291	2276	2272	5	100%
1951	2358	2348	2333	2317	2314	2	40%
1952	2368	2369	2358	2351	2339	0	0%
1953	2366	2369	2358	2351	2339	0	0%
1954	2358	2349	2335	2319	2315	2	40%
1955	2320	2309	2294	2276	2272	5	100%
1956	2368	2369	2358	2351	2339	0	0%
1957	2355	2353	2340	2334	2330	0	0%
1958	2368	2369	2358	2351	2339	0	0%
1959	2338	2327	2311	2292	2289	3	60%
1960	2316	2311	2300	2285	2282	5	100%
1961	2334	2329	2314	2295	2292	3	60%
1962	2320	2315	2304	2285	2280	5	100%
1963	2367	2367	2356	2351	2339	0	0%
1964	2314	2301	2283	2261	2258	5	100%
1965	2348	2344	2333	2328	2325	0	0%
1966	2359	2348	2335	2319	2314	2	40%
1967	2368	2369	2358	2351	2339	0	0%
1968	2342	2330	2313	2295	2288	3	60%
1969	2368	2369	2358	2351	2339	0	0%
1970	2337	2328	2312	2296	2290	3	60%
1971	2368	2369	2358	2351	2339	0	0%
1972	2351	2341	2326	2309	2301	2	40%
1973	2361	2353	2339	2333	2329	0	0%
1974	2368	2369	2358	2351	2339	0	0%
1975	2368	2369	2358	2351	2339	0	0%
1976	2334	2320	2303	2284	2281	4	80%
1977	2230	2200	2184	2179	2176	5	100%
1978	2330	2342	2335	2330	2328	0	0%
1979	2352	2341	2325	2310	2305	2	40%
1980	2361	2353	2344	2338	2334	0	0%
1981	2349	2336	2319	2301	2297	3	60%
1982	2367	2369	2358	2351	2339	0	0%
1983	2368	2369	2358	2351	2339	0	0%
1984	2362	2354	2343	2338	2334	0	0%
1985	2328	2314	2296	2275	2271	4	80%
1986	2343	2333	2317	2298	2295	3	60%
1987	2315	2300	2280	2257	2252	5	100%
1988	2288	2280	2267	2251	2244	5	100%
1989	2302	2293	2283	2278	2275	5	100%
1990	2290	2277	2263	2236	2229	5	100%
1991	2231	2217	2211	2193	2184	5	100%
						191	55%
Percent Availability During Recreation Season							45%

1922	2344	2345	2334	2327	2320	0	0%
1923	2327	2314	2296	2275	2272	3	60%
1924	2228	2219	2211	2190	2182	5	100%
1925	2299	2300	2289	2284	2282	5	100%
1926	2311	2294	2273	2248	2243	4	80%

Attachment D4

Trinity Elevation (ft)
No Action

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Stuart Forks Ramp threshold of 2320 msl?

Year	MAY	JUN	JUL	AUG	SEP	Months	% of Season
1927	2349	2351	2342	2336	2329	0	0%
1928	2357	2344	2329	2312	2299	1	20%
1929	2286	2271	2256	2248	2241	5	100%
1930	2279	2270	2255	2249	2244	5	100%
1931	2235	2219	2209	2184	2178	5	100%
1932	2230	2208	2184	2179	2173	5	100%
1933	2224	2228	2218	2192	2184	5	100%
1934	2238	2220	2202	2184	2179	5	100%
1935	2255	2245	2239	2232	2217	5	100%
1936	2261	2258	2244	2238	2231	5	100%
1937	2269	2270	2257	2252	2246	5	100%
1938	2364	2369	2358	2351	2339	0	0%
1939	2316	2300	2279	2255	2251	4	80%
1940	2336	2326	2311	2292	2285	2	40%
1941	2368	2369	2358	2351	2339	0	0%
1942	2368	2369	2358	2351	2338	0	0%
1943	2360	2355	2344	2338	2329	0	0%
1944	2322	2309	2292	2270	2264	4	80%
1945	2310	2314	2303	2285	2274	4	80%
1946	2332	2323	2311	2292	2287	2	40%
1947	2296	2288	2266	2241	2236	5	100%
1948	2296	2310	2301	2294	2291	5	100%
1949	2335	2325	2309	2290	2286	3	60%
1950	2311	2303	2291	2276	2272	4	80%
1951	2358	2348	2333	2317	2314	0	0%
1952	2368	2369	2358	2351	2339	0	0%
1953	2366	2369	2358	2351	2339	0	0%
1954	2358	2349	2335	2319	2315	0	0%
1955	2320	2309	2294	2276	2272	4	80%
1956	2368	2369	2358	2351	2339	0	0%
1957	2355	2353	2340	2334	2330	0	0%
1958	2368	2369	2358	2351	2339	0	0%
1959	2338	2327	2311	2292	2289	2	40%
1960	2316	2311	2300	2285	2282	3	60%
1961	2334	2329	2314	2295	2292	2	40%
1962	2320	2315	2304	2285	2280	3	60%
1963	2367	2367	2356	2351	2339	0	0%
1964	2314	2301	2283	2261	2258	4	80%
1965	2348	2344	2333	2328	2325	0	0%
1966	2359	2348	2335	2319	2314	0	0%
1967	2368	2369	2358	2351	2339	0	0%
1968	2342	2330	2313	2295	2288	2	40%
1969	2368	2369	2358	2351	2339	0	0%
1970	2337	2328	2312	2296	2290	2	40%
1971	2368	2369	2358	2351	2339	0	0%
1972	2351	2341	2326	2309	2301	2	40%
1973	2361	2353	2339	2333	2329	0	0%
1974	2368	2369	2358	2351	2339	0	0%
1975	2368	2369	2358	2351	2339	0	0%
1976	2334	2320	2303	2284	2281	3	60%
1977	2230	2200	2184	2179	2176	5	100%
1978	2330	2342	2335	2330	2328	0	0%
1979	2352	2341	2325	2310	2305	2	40%
1980	2361	2353	2344	2338	2334	0	0%
1981	2349	2336	2319	2301	2297	2	40%
1982	2367	2369	2358	2351	2339	0	0%
1983	2368	2369	2358	2351	2339	0	0%
1984	2362	2354	2343	2338	2334	0	0%
1985	2328	2314	2296	2275	2271	3	60%
1986	2343	2333	2317	2298	2295	2	40%
1987	2315	2300	2280	2257	2252	4	80%
1988	2288	2280	2267	2251	2244	5	100%
1989	2302	2293	2283	2278	2275	5	100%
1990	2290	2277	2263	2236	2229	5	100%
1991	2231	2217	2211	2193	2184	5	100%
						161	46%
Percent Availability During Recreation Season							54%

1922	2344	2345	2334	2327	2320	0	0%
1923	2327	2314	2296	2275	2272	2	40%
1924	2228	2219	2211	2190	2182	5	100%
1925	2299	2300	2289	2284	2282	3	60%
1926	2311	2294	2273	2248	2243	4	80%
1927	2349	2351	2342	2336	2329	0	0%
1928	2357	2344	2329	2312	2299	0	0%
1929	2286	2271	2256	2248	2241	5	100%
1930	2279	2270	2255	2249	2244	5	100%
1931	2235	2219	2209	2184	2178	5	100%

Attachment D4

Trinity Elevation (ft)
No Action

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Stuart Forks Ramp threshold of 2320 msl?

Year	MAY	JUN	JUL	AUG	SEP	Months	% of Season
1932	2230	2208	2184	2179	2173	5	100%
1933	2224	2228	2218	2192	2184	5	100%
1934	2238	2220	2202	2184	2179	5	100%
1935	2255	2245	2239	2232	2217	5	100%
1936	2261	2258	2244	2238	2231	5	100%
1937	2269	2270	2257	2252	2246	5	100%
1938	2364	2369	2358	2351	2339	0	0%
1939	2316	2300	2279	2255	2251	3	60%
1940	2336	2326	2311	2292	2285	2	40%
1941	2368	2369	2358	2351	2339	0	0%
1942	2368	2369	2358	2351	2338	0	0%
1943	2360	2355	2344	2338	2329	0	0%
1944	2322	2309	2292	2270	2264	3	60%
1945	2310	2314	2303	2285	2274	2	40%
1946	2332	2323	2311	2292	2287	2	40%
1947	2296	2288	2266	2241	2236	4	80%
1948	2296	2310	2301	2294	2291	2	40%
1949	2335	2325	2309	2290	2286	2	40%
1950	2311	2303	2291	2276	2272	3	60%
1951	2358	2348	2333	2317	2314	0	0%
1952	2368	2369	2358	2351	2339	0	0%
1953	2366	2369	2358	2351	2339	0	0%
1954	2358	2349	2335	2319	2315	0	0%
1955	2320	2309	2294	2276	2272	3	60%
1956	2368	2369	2358	2351	2339	0	0%
1957	2355	2353	2340	2334	2330	0	0%
1958	2368	2369	2358	2351	2339	0	0%
1959	2338	2327	2311	2292	2289	2	40%
1960	2316	2311	2300	2285	2282	2	40%
1961	2334	2329	2314	2295	2292	2	40%
1962	2320	2315	2304	2285	2280	2	40%
1963	2367	2367	2356	2351	2339	0	0%
1964	2314	2301	2283	2261	2258	3	60%
1965	2348	2344	2333	2328	2325	0	0%
1966	2359	2348	2335	2319	2314	0	0%
1967	2368	2369	2358	2351	2339	0	0%
1968	2342	2330	2313	2295	2288	2	40%
1969	2368	2369	2358	2351	2339	0	0%
1970	2337	2328	2312	2296	2290	1	20%
1971	2368	2369	2358	2351	2339	0	0%
1972	2351	2341	2326	2309	2301	0	0%
1973	2361	2353	2339	2333	2329	0	0%
1974	2368	2369	2358	2351	2339	0	0%
1975	2368	2369	2358	2351	2339	0	0%
1976	2334	2320	2303	2284	2281	2	40%
1977	2230	2200	2184	2179	2176	5	100%
1978	2330	2342	2335	2330	2328	0	0%
1979	2352	2341	2325	2310	2305	0	0%
1980	2361	2353	2344	2338	2334	0	0%
1981	2349	2336	2319	2301	2297	0	0%
1982	2367	2369	2358	2351	2339	0	0%
1983	2368	2369	2358	2351	2339	0	0%
1984	2362	2354	2343	2338	2334	0	0%
1985	2328	2314	2296	2275	2271	2	40%
1986	2343	2333	2317	2298	2295	1	20%
1987	2315	2300	2280	2257	2252	3	60%
1988	2288	2280	2267	2251	2244	5	100%
1989	2302	2293	2283	2278	2275	4	80%
1990	2290	2277	2263	2236	2229	5	100%
1991	2231	2217	2211	2193	2184	5	100%
						131	37%
Percent Availability During Recreation Season							63%

1922	2344	2345	2334	2327	2320	0	0%
1923	2327	2314	2296	2275	2272	0	0%
1924	2228	2219	2211	2190	2182	5	100%
1925	2299	2300	2289	2284	2282	0	0%
1926	2311	2294	2273	2248	2243	2	40%
1927	2349	2351	2342	2336	2329	0	0%
1928	2357	2344	2329	2312	2299	0	0%
1929	2286	2271	2256	2248	2241	3	60%
1930	2279	2270	2255	2249	2244	4	80%
1931	2235	2219	2209	2184	2178	5	100%
1932	2230	2208	2184	2179	2173	5	100%
1933	2224	2228	2218	2192	2184	5	100%
1934	2238	2220	2202	2184	2179	5	100%
1935	2255	2245	2239	2232	2217	5	100%
1936	2261	2258	2244	2238	2231	5	100%

Attachment D4

Trinity Elevation (ft)
No Action

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Stuart Forks Ramp threshold of 2320 msl?

Year	MAY	JUN	JUL	AUG	SEP	**Months**	**% of Season**
1937	2269	2270	2257	2252	2246	5	100%
1938	2364	2369	2358	2351	2339	0	0%
1939	2316	2300	2279	2255	2251	2	40%
1940	2336	2326	2311	2292	2285	0	0%
1941	2368	2369	2358	2351	2339	0	0%
1942	2368	2369	2358	2351	2338	0	0%
1943	2360	2355	2344	2338	2329	0	0%
1944	2322	2309	2292	2270	2264	2	40%
1945	2310	2314	2303	2285	2274	0	0%
1946	2332	2323	2311	2292	2287	0	0%
1947	2296	2288	2266	2241	2236	3	60%
1948	2296	2310	2301	2294	2291	0	0%
1949	2335	2325	2309	2290	2286	0	0%
1950	2311	2303	2291	2276	2272	0	0%
1951	2358	2348	2333	2317	2314	0	0%
1952	2368	2369	2358	2351	2339	0	0%
1953	2366	2369	2358	2351	2339	0	0%
1954	2358	2349	2335	2319	2315	0	0%
1955	2320	2309	2294	2276	2272	0	0%
1956	2368	2369	2358	2351	2339	0	0%
1957	2355	2353	2340	2334	2330	0	0%
1958	2368	2369	2358	2351	2339	0	0%
1959	2338	2327	2311	2292	2289	0	0%
1960	2316	2311	2300	2285	2282	0	0%
1961	2334	2329	2314	2295	2292	0	0%
1962	2320	2315	2304	2285	2280	0	0%
1963	2367	2367	2356	2351	2339	0	0%
1964	2314	2301	2283	2261	2258	2	40%
1965	2348	2344	2333	2328	2325	0	0%
1966	2359	2348	2335	2319	2314	0	0%
1967	2368	2369	2358	2351	2339	0	0%
1968	2342	2330	2313	2295	2288	0	0%
1969	2368	2369	2358	2351	2339	0	0%
1970	2337	2328	2312	2296	2290	0	0%
1971	2368	2369	2358	2351	2339	0	0%
1972	2351	2341	2326	2309	2301	0	0%
1973	2361	2353	2339	2333	2329	0	0%
1974	2368	2369	2358	2351	2339	0	0%
1975	2368	2369	2358	2351	2339	0	0%
1976	2334	2320	2303	2284	2281	0	0%
1977	2230	2200	2184	2179	2176	5	100%
1978	2330	2342	2335	2330	2328	0	0%
1979	2352	2341	2325	2310	2305	0	0%
1980	2361	2353	2344	2338	2334	0	0%
1981	2349	2336	2319	2301	2297	0	0%
1982	2367	2369	2358	2351	2339	0	0%
1983	2368	2369	2358	2351	2339	0	0%
1984	2362	2354	2343	2338	2334	0	0%
1985	2328	2314	2296	2275	2271	0	0%
1986	2343	2333	2317	2298	2295	0	0%
1987	2315	2300	2280	2257	2252	2	40%
1988	2288	2280	2267	2251	2244	3	60%
1989	2302	2293	2283	2278	2275	0	0%
1990	2290	2277	2263	2236	2229	3	60%
1991	2231	2217	2211	2193	2184	5	100%
						76	22%
Percent Availability During Recreation Season							78%

1922	2344	2345	2334	2327	2320	0	0%
1923	2327	2314	2296	2275	2272	0	0%
1924	2228	2219	2211	2190	2182	0	0%
1925	2299	2300	2289	2284	2282	0	0%
1926	2311	2294	2273	2248	2243	0	0%
1927	2349	2351	2342	2336	2329	0	0%
1928	2357	2344	2329	2312	2299	0	0%
1929	2286	2271	2256	2248	2241	0	0%
1930	2279	2270	2255	2249	2244	0	0%
1931	2235	2219	2209	2184	2178	0	0%
1932	2230	2208	2184	2179	2173	0	0%
1933	2224	2228	2218	2192	2184	0	0%
1934	2238	2220	2202	2184	2179	0	0%
1935	2255	2245	2239	2232	2217	0	0%
1936	2261	2258	2244	2238	2231	0	0%
1937	2269	2270	2257	2252	2246	0	0%
1938	2364	2369	2358	2351	2339	0	0%
1939	2316	2300	2279	2255	2251	0	0%
1940	2336	2326	2311	2292	2285	0	0%
1941	2368	2369	2358	2351	2339	0	0%

Attachment D4

Trinity Elevation (ft)
No Action

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Stuart Forks Ramp threshold of 2320 msl?

Year	MAY	JUN	JUL	AUG	SEP	**Months**	**% of Season**
1942	2368	2369	2358	2351	2338	0	0%
1943	2360	2355	2344	2338	2329	0	0%
1944	2322	2309	2292	2270	2264	0	0%
1945	2310	2314	2303	2285	2274	0	0%
1946	2332	2323	2311	2292	2287	0	0%
1947	2296	2288	2266	2241	2236	0	0%
1948	2296	2310	2301	2294	2291	0	0%
1949	2335	2325	2309	2290	2286	0	0%
1950	2311	2303	2291	2276	2272	0	0%
1951	2358	2348	2333	2317	2314	0	0%
1952	2368	2369	2358	2351	2339	0	0%
1953	2366	2369	2358	2351	2339	0	0%
1954	2358	2349	2335	2319	2315	0	0%
1955	2320	2309	2294	2276	2272	0	0%
1956	2368	2369	2358	2351	2339	0	0%
1957	2355	2353	2340	2334	2330	0	0%
1958	2368	2369	2358	2351	2339	0	0%
1959	2338	2327	2311	2292	2289	0	0%
1960	2316	2311	2300	2285	2282	0	0%
1961	2334	2329	2314	2295	2292	0	0%
1962	2320	2315	2304	2285	2280	0	0%
1963	2367	2367	2356	2351	2339	0	0%
1964	2314	2301	2283	2261	2258	0	0%
1965	2348	2344	2333	2328	2325	0	0%
1966	2359	2348	2335	2319	2314	0	0%
1967	2368	2369	2358	2351	2339	0	0%
1968	2342	2330	2313	2295	2288	0	0%
1969	2368	2369	2358	2351	2339	0	0%
1970	2337	2328	2312	2296	2290	0	0%
1971	2368	2369	2358	2351	2339	0	0%
1972	2351	2341	2326	2309	2301	0	0%
1973	2361	2353	2339	2333	2329	0	0%
1974	2368	2369	2358	2351	2339	0	0%
1975	2368	2369	2358	2351	2339	0	0%
1976	2334	2320	2303	2284	2281	0	0%
1977	2230	2200	2184	2179	2176	0	0%
1978	2330	2342	2335	2330	2328	0	0%
1979	2352	2341	2325	2310	2305	0	0%
1980	2361	2353	2344	2338	2334	0	0%
1981	2349	2336	2319	2301	2297	0	0%
1982	2367	2369	2358	2351	2339	0	0%
1983	2368	2369	2358	2351	2339	0	0%
1984	2362	2354	2343	2338	2334	0	0%
1985	2328	2314	2296	2275	2271	0	0%
1986	2343	2333	2317	2298	2295	0	0%
1987	2315	2300	2280	2257	2252	0	0%
1988	2288	2280	2267	2251	2244	0	0%
1989	2302	2293	2283	2278	2275	0	0%
1990	2290	2277	2263	2236	2229	0	0%
1991	2231	2217	2211	2193	2184	0	0%
						0	0%
Percent Availability During Recreation Season							100%

Attachment D4

Whiskeytown Elevation (ft)
Existing Conditions

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Oak Bottom Marina threshold of 1198?

Year	MAY	JUN	JUL	AUG	SEP	Months	% of Season
1922	1209	1209	1209	1209	1208	0	0%
1923	1209	1209	1209	1209	1208	0	0%
1924	1209	1209	1209	1209	1208	0	0%
1925	1209	1209	1209	1209	1208	0	0%
1926	1209	1209	1209	1209	1208	0	0%
1927	1209	1209	1209	1209	1208	0	0%
1928	1209	1209	1209	1209	1208	0	0%
1929	1209	1209	1209	1209	1208	0	0%
1930	1209	1209	1209	1209	1208	0	0%
1931	1209	1209	1209	1209	1208	0	0%
1932	1209	1209	1209	1209	1208	0	0%
1933	1209	1209	1209	1209	1208	0	0%
1934	1209	1209	1209	1209	1208	0	0%
1935	1209	1209	1209	1209	1208	0	0%
1936	1209	1209	1209	1209	1208	0	0%
1937	1209	1209	1209	1209	1208	0	0%
1938	1209	1209	1209	1209	1208	0	0%
1939	1209	1209	1209	1209	1208	0	0%
1940	1209	1209	1209	1209	1208	0	0%
1941	1209	1209	1209	1209	1208	0	0%
1942	1209	1209	1209	1209	1208	0	0%
1943	1209	1209	1209	1209	1208	0	0%
1944	1209	1209	1209	1209	1208	0	0%
1945	1209	1209	1209	1209	1208	0	0%
1946	1209	1209	1209	1209	1208	0	0%
1947	1209	1209	1209	1209	1208	0	0%
1948	1209	1209	1209	1209	1208	0	0%
1949	1209	1209	1209	1209	1208	0	0%
1950	1209	1209	1209	1209	1208	0	0%
1951	1209	1209	1209	1209	1208	0	0%
1952	1209	1209	1209	1209	1208	0	0%
1953	1209	1209	1209	1209	1208	0	0%
1954	1209	1209	1209	1209	1208	0	0%
1955	1209	1209	1209	1209	1208	0	0%
1956	1209	1209	1209	1209	1208	0	0%
1957	1209	1209	1209	1209	1208	0	0%
1958	1209	1209	1209	1209	1208	0	0%
1959	1209	1209	1209	1209	1208	0	0%
1960	1209	1209	1209	1209	1208	0	0%
1961	1209	1209	1209	1209	1208	0	0%
1962	1209	1209	1209	1209	1208	0	0%
1963	1209	1209	1209	1209	1208	0	0%
1964	1209	1209	1209	1209	1208	0	0%
1965	1209	1209	1209	1209	1208	0	0%
1966	1209	1209	1209	1209	1208	0	0%
1967	1209	1209	1209	1209	1208	0	0%
1968	1209	1209	1209	1209	1208	0	0%
1969	1209	1209	1209	1209	1208	0	0%
1970	1209	1209	1209	1209	1208	0	0%
1971	1209	1209	1209	1209	1208	0	0%
1972	1209	1209	1209	1209	1208	0	0%
1973	1209	1209	1209	1209	1208	0	0%
1974	1209	1209	1209	1209	1208	0	0%
1975	1209	1209	1209	1209	1208	0	0%
1976	1209	1209	1209	1209	1208	0	0%
1977	1209	1209	1209	1209	1208	0	0%
1978	1209	1209	1209	1209	1208	0	0%
1979	1209	1209	1209	1209	1208	0	0%
1980	1209	1209	1209	1209	1208	0	0%
1981	1209	1209	1209	1209	1208	0	0%
1982	1209	1209	1209	1209	1208	0	0%
1983	1209	1209	1209	1209	1208	0	0%
1984	1209	1209	1209	1209	1208	0	0%
1985	1209	1209	1209	1209	1208	0	0%
1986	1209	1209	1209	1209	1208	0	0%
1987	1209	1209	1209	1209	1208	0	0%
1988	1209	1209	1209	1209	1208	0	0%
1989	1209	1209	1209	1209	1208	0	0%
1990	1209	1209	1209	1209	1208	0	0%
1991	1209	1209	1209	1209	1208	0	0%
						0	0%
Percent Availability During Recreation Season							100%
1922	1209	1209	1209	1209	1208	0	0%
1923	1209	1209	1209	1209	1208	0	0%
1924	1209	1209	1209	1209	1208	0	0%
1925	1209	1209	1209	1209	1208	0	0%
1926	1209	1209	1209	1209	1208	0	0%

Attachment D4

Whiskeytown Elevation (ft)
Existing Conditions

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Oak Bottom Marina threshold of 1198?

Year	MAY	JUN	JUL	AUG	SEP	Months	% of Season
1927	1209	1209	1209	1209	1208	0	0%
1928	1209	1209	1209	1209	1208	0	0%
1929	1209	1209	1209	1209	1208	0	0%
1930	1209	1209	1209	1209	1208	0	0%
1931	1209	1209	1209	1209	1208	0	0%
1932	1209	1209	1209	1209	1208	0	0%
1933	1209	1209	1209	1209	1208	0	0%
1934	1209	1209	1209	1209	1208	0	0%
1935	1209	1209	1209	1209	1208	0	0%
1936	1209	1209	1209	1209	1208	0	0%
1937	1209	1209	1209	1209	1208	0	0%
1938	1209	1209	1209	1209	1208	0	0%
1939	1209	1209	1209	1209	1208	0	0%
1940	1209	1209	1209	1209	1208	0	0%
1941	1209	1209	1209	1209	1208	0	0%
1942	1209	1209	1209	1209	1208	0	0%
1943	1209	1209	1209	1209	1208	0	0%
1944	1209	1209	1209	1209	1208	0	0%
1945	1209	1209	1209	1209	1208	0	0%
1946	1209	1209	1209	1209	1208	0	0%
1947	1209	1209	1209	1209	1208	0	0%
1948	1209	1209	1209	1209	1208	0	0%
1949	1209	1209	1209	1209	1208	0	0%
1950	1209	1209	1209	1209	1208	0	0%
1951	1209	1209	1209	1209	1208	0	0%
1952	1209	1209	1209	1209	1208	0	0%
1953	1209	1209	1209	1209	1208	0	0%
1954	1209	1209	1209	1209	1208	0	0%
1955	1209	1209	1209	1209	1208	0	0%
1956	1209	1209	1209	1209	1208	0	0%
1957	1209	1209	1209	1209	1208	0	0%
1958	1209	1209	1209	1209	1208	0	0%
1959	1209	1209	1209	1209	1208	0	0%
1960	1209	1209	1209	1209	1208	0	0%
1961	1209	1209	1209	1209	1208	0	0%
1962	1209	1209	1209	1209	1208	0	0%
1963	1209	1209	1209	1209	1208	0	0%
1964	1209	1209	1209	1209	1208	0	0%
1965	1209	1209	1209	1209	1208	0	0%
1966	1209	1209	1209	1209	1208	0	0%
1967	1209	1209	1209	1209	1208	0	0%
1968	1209	1209	1209	1209	1208	0	0%
1969	1209	1209	1209	1209	1208	0	0%
1970	1209	1209	1209	1209	1208	0	0%
1971	1209	1209	1209	1209	1208	0	0%
1972	1209	1209	1209	1209	1208	0	0%
1973	1209	1209	1209	1209	1208	0	0%
1974	1209	1209	1209	1209	1208	0	0%
1975	1209	1209	1209	1209	1208	0	0%
1976	1209	1209	1209	1209	1208	0	0%
1977	1209	1209	1209	1209	1208	0	0%
1978	1209	1209	1209	1209	1208	0	0%
1979	1209	1209	1209	1209	1208	0	0%
1980	1209	1209	1209	1209	1208	0	0%
1981	1209	1209	1209	1209	1208	0	0%
1982	1209	1209	1209	1209	1208	0	0%
1983	1209	1209	1209	1209	1208	0	0%
1984	1209	1209	1209	1209	1208	0	0%
1985	1209	1209	1209	1209	1208	0	0%
1986	1209	1209	1209	1209	1208	0	0%
1987	1209	1209	1209	1209	1208	0	0%
1988	1209	1209	1209	1209	1208	0	0%
1989	1209	1209	1209	1209	1208	0	0%
1990	1209	1209	1209	1209	1208	0	0%
1991	1209	1209	1209	1209	1208	0	0%
						0	0%
				Percent Availability During Recreation Season			100%
1922	1209	1209	1209	1209	1208	0	0%
1923	1209	1209	1209	1209	1208	0	0%
1924	1209	1209	1209	1209	1208	0	0%
1925	1209	1209	1209	1209	1208	0	0%
1926	1209	1209	1209	1209	1208	0	0%
1927	1209	1209	1209	1209	1208	0	0%
1928	1209	1209	1209	1209	1208	0	0%
1929	1209	1209	1209	1209	1208	0	0%
1930	1209	1209	1209	1209	1208	0	0%
1931	1209	1209	1209	1209	1208	0	0%

Attachment D4

Whiskeytown Elevation (ft)
Existing Conditions

On average, how many of these months (recreation season May - Sept.) does the reservoir drop below the Oak Bottom Marina threshold of 1198?

Year	MAY	JUN	JUL	AUG	SEP	**Months**	**% of Season**
1932	1209	1209	1209	1209	1208	0	0%
1933	1209	1209	1209	1209	1208	0	0%
1934	1209	1209	1209	1209	1208	0	0%
1935	1209	1209	1209	1209	1208	0	0%
1936	1209	1209	1209	1209	1208	0	0%
1937	1209	1209	1209	1209	1208	0	0%
1938	1209	1209	1209	1209	1208	0	0%
1939	1209	1209	1209	1209	1208	0	0%
1940	1209	1209	1209	1209	1208	0	0%
1941	1209	1209	1209	1209	1208	0	0%
1942	1209	1209	1209	1209	1208	0	0%
1943	1209	1209	1209	1209	1208	0	0%
1944	1209	1209	1209	1209	1208	0	0%
1945	1209	1209	1209	1209	1208	0	0%
1946	1209	1209	1209	1209	1208	0	0%
1947	1209	1209	1209	1209	1208	0	0%
1948	1209	1209	1209	1209	1208	0	0%
1949	1209	1209	1209	1209	1208	0	0%
1950	1209	1209	1209	1209	1208	0	0%
1951	1209	1209	1209	1209	1208	0	0%
1952	1209	1209	1209	1209	1208	0	0%
1953	1209	1209	1209	1209	1208	0	0%
1954	1209	1209	1209	1209	1208	0	0%
1955	1209	1209	1209	1209	1208	0	0%
1956	1209	1209	1209	1209	1208	0	0%
1957	1209	1209	1209	1209	1208	0	0%
1958	1209	1209	1209	1209	1208	0	0%
1959	1209	1209	1209	1209	1208	0	0%
1960	1209	1209	1209	1209	1208	0	0%
1961	1209	1209	1209	1209	1208	0	0%
1962	1209	1209	1209	1209	1208	0	0%
1963	1209	1209	1209	1209	1208	0	0%
1964	1209	1209	1209	1209	1208	0	0%
1965	1209	1209	1209	1209	1208	0	0%
1966	1209	1209	1209	1209	1208	0	0%
1967	1209	1209	1209	1209	1208	0	0%
1968	1209	1209	1209	1209	1208	0	0%
1969	1209	1209	1209	1209	1208	0	0%
1970	1209	1209	1209	1209	1208	0	0%
1971	1209	1209	1209	1209	1208	0	0%
1972	1209	1209	1209	1209	1208	0	0%
1973	1209	1209	1209	1209	1208	0	0%
1974	1209	1209	1209	1209	1208	0	0%
1975	1209	1209	1209	1209	1208	0	0%
1976	1209	1209	1209	1209	1208	0	0%
1977	1209	1209	1209	1209	1208	0	0%
1978	1209	1209	1209	1209	1208	0	0%
1979	1209	1209	1209	1209	1208	0	0%
1980	1209	1209	1209	1209	1208	0	0%
1981	1209	1209	1209	1209	1208	0	0%
1982	1209	1209	1209	1209	1208	0	0%
1983	1209	1209	1209	1209	1208	0	0%
1984	1209	1209	1209	1209	1208	0	0%
1985	1209	1209	1209	1209	1208	0	0%
1986	1209	1209	1209	1209	1208	0	0%
1987	1209	1209	1209	1209	1208	0	0%
1988	1209	1209	1209	1209	1208	0	0%
1989	1209	1209	1209	1209	1208	0	0%
1990	1209	1209	1209	1209	1208	0	0%
1991	1209	1209	1209	1209	1208	0	0%
						0	0%
				Percent Availability During Recreation Season			100%

2.4.5 Technical Appendix E—Land Use

1.1 Residential/Municipal and Industrial *(SEE SUBSECTIONS)*

1.1.1 Affected Environment *(NO CHANGE)*

1.1.2 Environmental Consequences **(CHANGES FOLLOW)**

pg. E-18

The following new section has been added immediately following 1.1.2.9 Existing Conditions versus Preferred Alternative (see Section 2.4.5.1 for new Table E-18A) :

1.1.2.10 Cumulative Impacts

M&I Land Use. Surface-water deliveries to municipal water service contractors north and south of the Delta could be influenced by future demands for water as well as CVP and SWP operational limitations in meeting other needs (Table E-18A).

Impacts Relative to the No Action Alternative. Average M&I surface-water delivery is estimated to decrease by 6,800 af in the Sacramento Valley Region. Groundwater, other local supplies, and a small amount of price-induced conservation are projected to be used to eliminate this shortfall at a cost of $1.1 to $1.9 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries would be reduced by 15,800 af compared to the No Action Alternative. Some of the resulting shortage is projected to be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The costs of drought conservation would increase about $3.6 million annually compared to the No Action Alternative[1].

In the Bay Area, average M&I surface-water delivery is estimated to decrease by 17,200 af. Conservation, reclamation, and a small amount of price-induced conservation (i.e., conservation resulting from an increase in the retail price) are assumed to be used to eliminate this shortfall at a cost of $2.7 to $4.5 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries would be reduced by 41,100 af compared to the No Action Alternative. Some of the resulting shortage would be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought water supplies would be acquired to eliminate the remaining shortage. The costs of these dry-condition supplies would increase about $44 to $76 million annually compared to the No Action Alternative.

In the San Joaquin Valley, average M&I surface-water delivery is estimated to decrease by 2,100 af. Groundwater, other local supplies, and a small amount of price-induced conservation are assumed to be used to eliminate this shortfall at a cost of $0.3 to $0.7 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries are projected to be reduced by 2,900 af compared to the No Action Alternative. Some of the resulting shortage would be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The

[1] Dry-condition costs are in addition to the average-condition costs and occur only in dry years (1928 through 1934, or about once every 5 years on average).

costs of drought conservation would increase about $0.2 million annually compared to the No Action Alternative.

Impacts Relative to Existing Conditions. Average surface-water delivery for municipal use is estimated to increase by 18,600 af in the Sacramento Valley Region. Average-condition shortfall is projected to increase from zero to 10,100 af. The shortfall occurs because the increase in surface-water delivery is not enough to meet increased demand in 2020 in affected service areas. Groundwater, other local supplies, and a small amount of price-induced conservation is assumed to be used to eliminate this shortfall at a cost of $1.7 to $2.7 million annually. The average retail price increase needed to cover these costs would be more than 1 percent on average, which is significant. However, as evidenced above in the comparison of the cumulative condition to No Action, the majority of gap between supply and demand is associated with assumed increased population growth. In the dry condition, CVP contract deliveries would be increased by 2,200 af compared to existing conditions, but shortage would increase by 11,900 af. Some of the resulting shortage would be eliminated using yield from water supplies acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The costs of drought conservation would increase about $0.8 million annually compared to existing conditions.

In the Bay Area, average surface-water delivery is estimated to increase by 5,200 af. Average-condition shortfall is projected to increase from zero to 8,400 af. The shortfall is projected to occur because the increase in surface-water delivery is not enough to meet 2020 demand in affected service areas. Conservation, reclamation, and a small amount of price-induced conservation would be used to eliminate this shortfall at a cost of $3.9 to $6.5 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries are projected to be reduced by 36,100 af compared to existing conditions. Some of the resulting shortage is assumed to be eliminated using the water acquired for the average condition. It is assumed that drought water supplies would be acquired to eliminate the remaining shortage. The cost of dry-condition supplies would increase about $78 to $198 million annually compared to existing conditions.

In the San Joaquin Valley, average surface-water delivery is estimated to increase by 900 af. Average-condition shortfall is projected to increase from zero to 2,400 af. The shortfall is projected to occur because the increase in surface-water delivery is not enough to meet 2020 demand in affected service areas. Groundwater, other local supplies, and a small amount of price-induced conservation are assumed to be used to eliminate this shortfall at a cost of $0.4 to $0.8 million annually. The average retail price increase needed to cover these costs would not be significant. In the dry condition, CVP contract deliveries are projected to be increased by 100 af compared to existing conditions. Some of the resulting shortage is assumed to be eliminated using water acquired for the average condition. It is assumed that drought conservation would be used to manage the remaining shortage. The costs of drought conservation would increase about $0.8 million annually compared to the existing conditions.

1.2 Agriculture *(NO CHANGE)*

1.2.1 Affected Environment *(NO CHANGE)*

1.2.2 Environmental Consequences *(NO CHANGE)*

1.3 Real Estate **(CHANGES FOLLOW)**
pg. E-36

Residential ~~and commercial~~ properties can be found in the general vicinity of the reservoirs and rivers being studied in this EIS. The value of these properties could be affected by changing water elevations and instream flows. As a result, the basic question from a property value perspective is how would fluctuations in reservoir water elevations and river instream flows affect property values. This section provides a qualitative discussion of the potential impacts to residential ~~and commercial~~ reservoir property values of varying Trinity, Whiskeytown, and Shasta Reservoir water elevations ~~and Trinity and Sacramento River instream flows~~ associated with the various Trinity River EIS alternatives. River properties were not evaluated due to the ambiguous nature of the overall impact. Since some river properties may benefit from the improved fishery and others may suffer from flooding, no clear relationship could be assumed.

1.3.1 Affected Environment **(CHANGES FOLLOW)**
pg. E-37

~~**1.3.1.1 Reservoir-oriented Properties**~~

~~**1.3.1.2 River-oriented Properties**~~

~~**Trinity River Basin**. The section of the Trinity River affected by the alternatives consists of the area downstream of Lewiston Reservoir to the confluence with the Klamath River. The last stage of the Trinity River, prior to combining with the Klamath River, is found on the Hoopa Valley Indian Reservation. Since the concept of property values is foreign to the tribes, the real estate analysis excluded this area. A number of relatively small communities are found along the river downstream of Lewiston Dam; they include: Lewiston, Douglas City, Junction City, Big Bar, Del Loma, Burnt Ranch, Salyer, and Willow Creek.~~

~~**Lower Klamath River Basin/Coastal Area**. The lower Klamath River, reflecting the area downstream of the confluence with the Trinity River, consists entirely of the Yurok Indian Reservation. Since the concept of property values is foreign to the tribes, the real estate analysis excluded this area.~~

~~**Central Valley**. The Central Valley reflects a vast geographic area with numerous towns and cities of various sizes. Since the alternatives under consideration are not expected to create a perceptual change in instream flows, no discernible impacts to Central Valley riverside properties is expected. As a result, Central Valley residential property values impacts will not be addressed in any detail.~~

1.3.2 Environmental Consequences *(SEE SUBSECTIONS)*

1.3.2.1 Methodology **(CHANGES FOLLOW)**
pg. E-38

A literature review on the affect of water bodies on property values was conducted with the objective of obtaining a sufficient number of relevant studies for presentation of a range of possible property value impacts (elaboration on the literature review can be found in Attachment E2). This goal proved overly optimistic since only a few relevant studies were located. The studies that were obtained generally indicated a positive relationship between

property values and the existence of and proximity to water bodies. The studies focusing on property value impacts related to reservoir water level fluctuation also revealed a positive relationship—as water levels drop, so do property values. This relationship was assumed to hold for the reservoirs under consideration in this study. ~~Because of the lack of relevant literature, a~~ A comparative analysis is presented that includes rankings of a series of water level factors ~~(e.g., water levels and fish populations)~~ deemed to be of potential interest to ~~the various~~ reservoir property owners ~~groups~~.

~~**1.3.2.2 Reservoir-oriented Properties**~~

pg. E-39

~~Methodology:~~ Water level information from the PROSIM hydrologic model was used to evaluate the magnitude of possible drawdowns and annual/ monthly fluctuations for each alternative. PROSIM estimates end-of-month reservoir water levels by alternative for each year in the 69-year hydrologic period of record (1922-1990) by superimposing alternative-specific operating criteria on historic water supply data. End-of-month water levels provide the basis for the reservoir property value comparison. While fluctuation in end-of-month water levels is somewhat less than that of daily water levels, a comparison of monthly and daily actual historic water level data indicated the difference to be fairly minor. The PROSIM data were used to calculate average monthly water levels across the entire 69-year period (represents the average water year), and for each of the five water-year classes: critically dry, dry, normal, wet, and extremely wet. The monthly averages were used to calculate annual average water levels for the average year and for each water-year class. In addition, the data were used to calculate annual averages for each of the 69 years in the hydrologic record as well as ranges in monthly water levels for each year.

1.3.2.2 Reservoir Property Impacts **(CHANGES FOLLOW)**

pgs. E-40 and E-41

Trinity River Basin.

Trinity Reservoir.

Tables E-45 and E-46 have been revised to correct inaccurate data. See Section 2.4.5.1 for revised Tables E-45 and E-46.

Summary Results: From the short-term drawdown perspective, regardless of whether one considers the entire year or only the high-use recreation season, the State Permit Alternative is estimated to result in the greatest gain in average water levels as compared to the No Action Alternative (additional ~~13~~9 feet for full year and ~~16~~ 10 feet for high recreation season). However, this gain still does not achieve historical average water levels experienced during the 1963-1998 period[2]. The Flow Evaluation and Percent Inflow Alternatives ~~are also estimated to produce gains~~ proved to be essentially the same in terms of average water levels as ~~compared to~~ the No Action Alternative~~, although to a lesser degree (in the range of 3-6 additional feet)~~. The Maximum Flow Alternative is the only alternative where average water levels are expected to experience substantial declines (~~14~~ 18-foot drop for full year and ~~20~~26-foot drop for high season) compared to the No Action Alternative.

[2] Trinity Dam was completed in 1962. The 1963 water year reflects the first year after the reservoir filled.

From the long-term perspective of annual fluctuation, the Maximum Flow Alternative consistently results in the smallest range between high and low water levels considering either the entire year or the high-use recreation season. The 102-foot range in average annual values across all years associated with the Maximum Flow Alternative falls well below the ~~159~~155-foot range associated with the No Action Alternative and the historical range in annual fluctuation from 1963-1998 of 138 feet. All alternatives are expected to result in a tighter range in annual fluctuation as compared to the No Action, with the Flow Evaluation and Percent Inflow Alternatives generally tighter than the State Permit Alternative.

From the long-term perspective of monthly fluctuation, again the Maximum Flow Alternative consistently results in the tightest water level ranges regardless of whether one considers the entire year or the high-use recreation season. The monthly fluctuation ranges associated with the Maximum Flow Alternative are noticeably tighter than the No Action Alternative and the actual historical ranges experienced during the 1963-1998 period. Depending on the monthly fluctuation measure, the Flow Evaluation and Percent Inflow Alternatives ~~either~~ generally result in a sizable drop ~~or a minor increase~~ in water level ranges compared to the No Action Alternative.

~~Aggregating ranks across all three categories of water level measures results in the Flow Evaluation Alternative ranking first overall from the entire year and high recreation season perspectives. The Flow Evaluation Alternative came in second of five for the high recreation season. This ranks fourth out of the five alternatives (surpassing only the Maximum Flow Alternative), under the premise that the higher the water level the better. Both the entire year and high season values are much lower than the 2,326 actual historical average water level experienced during the 1963-1998 period.~~

Aggregating ranks across all three categories of water level measures results in the Flow Evaluation/ Preferred Alternative ranking first overall from both the entire year and high recreation season perspectives. The Flow Evaluation Alternative came in second in five of the seven water level categories from both full year and high recreation season perspectives. The Maximum Flow Alternative tied for first based on the high recreation season and second overall in the entire year comparison. This alternative consistently ranked first in terms of long-term annual and monthly fluctuation, but last in terms of drawdown. The State Permit Alternative came in third from both full year and high recreation season perspectives, ranking first in drawdown but last in annual and monthly fluctuation. The Percent Inflow Alternative came in fourth from the full year perspective, but second for the high recreation season. The No Action/ Mechanical Restoration Alternatives ranked last from both full year and high recreation season perspectives.

No Action (and Mechanical Restoration) Alternatives.

Drawdown: Average water level predicted for the No Action Alternative was estimated at 2,302 for the entire year and 2,307 for the high recreation season. This ranks third and tied for second (with Flow Evaluation Alternative) respectively, from the full year and high recreation season perspectives, based on the premise that the higher the water level the better. Both the entire year and high recreation season values are much lower than the 2,326 actual historic average water level experienced during the 1963-1998 period.

Annual Fluctuation: Reviewing the range between high and low annual averages across water-year classes and all years individually, the No Action Alternative ranked last with the largest ranges of any alternative from both the full year and high recreation season perspectives. The expected range across individual years of ~~159~~ 155 feet from the full year perspective exceeded the historical range of 138 feet.

Monthly Fluctuation: Based on the range/ averages for the four monthly fluctuation measures, the No Action Alternative ranked tied for fourth, ~~surpassing only~~ (with the State Permit Alternative) from ~~both~~ the full year ~~and high recreation season~~ perspective~~s.~~ and third from the high recreation season perspective. In comparison with historical monthly fluctuation, the No Action Alternative is expected to achieve lower ranges in monthly fluctuation. The most pronounced reduction in range occurs within individual monthly values across all years where the No Action Alternative is expected to experience a range of ~~204~~ 200 feet (high of 2,369 and low of ~~2,165~~ 2,169) compared to the historically experienced range of 253 feet.

pg. E-42

Aggregating ranks across the drawdown, annual fluctuation, and monthly fluctuation measures resulted in the No Action Alternative being ranked last from both full year and high recreation season perspectives.

Maximum Flow Alternative.

Annual Fluctuation: Reviewing the range between high and low annual averages across water-year classes and all years individually, the Maximum Flow Alternative ranked first with the smallest ranges of any alternative from both the full year and high recreation season perspectives. The expected range across individual years of 102 feet from the full year perspective fell well below the No Action Alternative range of ~~159~~ 155 feet and the 1963-1998 historical range of 138 feet.

Flow Evaluation Alternative.
pgs. E-42 and E-43

Annual Fluctuation: Reviewing the range between high and low annual averages across water-year classes and all years individually, the Flow Evaluation Alternative ranked second (tied with Percent Inflow Alternative from the full year perspective). The expected range across individual years of 123 feet from the full year perspective fell below the ~~159~~ 155-foot range of the No Action Alternative and the 1963-1998 historical range of 138 feet.

Monthly Fluctuation: Based on the range/ averages for the four monthly fluctuation measures, the Flow Evaluation Alternative ranked second from both the full year and ~~perspective and third from the~~ high recreation season perspectives (tied with Percent Inflow Alternative for the high recreation season). The range in monthly water levels across individual months was estimated at ~~41~~ 37 and 39 feet below the No Action Alternative, respectively, from full year and high recreation season perspectives.

Aggregating ranks across the drawdown, annual fluctuation, and monthly fluctuation measures resulted in the Flow Evaluation Alternative being ranked first from ~~the~~ both full year and ~~perspective and tied for first (with the Maximum Flow Alternative) for the~~ high

recreation season perspectives (tied with Maximum Flow Alternative for high recreation season). From both perspectives, the Flow Evaluation Alternative came in second ~~for~~ in five of the seven water level measures.

Percent Inflow Alternative.
pg. E-43

Drawdown: Average water level predicted for the Percent Inflow Alternative was estimated at 2,301 for the entire year and 2,306 for the high recreation season. This ranks ~~third out of the five alternatives~~ fourth from the full year perspective, but third from the high recreation season perspective. Both the entire year and high season values are much lower than the 2,326 actual historical average water level experienced during the 1963-1998 period.

Annual Fluctuation: Reviewing the range between high and low annual averages across water-year classes and all years individually, the Percent Inflow Alternative ranked tied for second (with the Flow Evaluation Alternative) from the full year perspective and third from the recreation season perspective. The expected range across individual years of 125 feet from the full year perspective fell below the ~~159~~ 155-foot range associated with the No Action Alternative and the historical range of 138 feet.

Monthly Fluctuation: Based on the range/ averages for the four monthly fluctuation measures, the Percent Inflow Alternative ranked third for the entire year and ~~second~~ tied for second (with Flow Evaluation Alternative) for the high recreation season. The range in monthly water levels across individual months was estimated at ~~38~~ 34 and 33 feet below the No Action Alternative, respectively, from full year and high recreation season perspectives.

Aggregating ranks across the drawdown, annual fluctuation, and monthly fluctuation measures resulted in the Percent Inflow Alternative being ranked ~~third; tied with the State Permit Alternative~~ fourth from the full year perspective and second from the high recreation season perspective (although two alternatives were tied for first under the high recreation season).

State Permit Alternative.
pg. E-44

Annual Fluctuation: Reviewing the range between high and low annual averages across water-year classes and all years individually, the State Permit Alternative ranked next to last, slightly undercutting the ranges of only the No Action Alternative from both the full year and high recreation season perspectives. The expected range across individual years of 151 feet from the full year perspective exceeded the historical range of 138 feet.

Monthly Fluctuation: Based on the range/ averages for the four monthly fluctuation measures, the State Permit Alternative ranked last from both ~~entire~~ full year and high recreation season perspectives (tied with No Action for full year).

Aggregating ranks across the drawdown, annual fluctuation, and monthly fluctuation measures resulted in the State Permit Alternative being ranked third~~; tied with the Percent Inflow Alternative~~ from both the full year ~~perspective and third from the~~ and high recreation season perspective (although two alternatives were tied for first under the high recreation season).

Existing Conditions versus Preferred Alternative.

pg. E-45

Central Valley.

Shasta Reservoir.

Summary Results: From the short-term drawdown perspective, regardless of whether one considers the entire year or only the high-use recreation season, the State Permit Alternative is estimated to result in the only gain, albeit minor, in average water levels as compared to the No Action Alternative. The State Permit average water level of 1,018 slightly exceeds the historical average water level experienced during the 1945-1998 period[3]. The No Action Alternative comes in a close second at 1,016 feet. The Maximum Flow Alternative is the only alternative where average water levels are expected to decline noticeably compared to the No Action (average water level is expected to be 10 feet for both entire year and high recreation season perspectives). As a result, the Maximum Flow Alternative ranks last in terms of drawdown. From the long-term perspective of annual fluctuation, the No Action Alternative consistently results in the smallest range between high and low water levels considering either the entire year or the high-use recreation season. The 109-foot range in average annual values across all years associated with the No Action Alternative falls well below the historical range in annual fluctuation of 146 feet. The State Permit and Percent Inflow Alternatives rank second and third from both entire year and high recreation season perspectives, with ranges only slightly higher than those of the No Action Alternative. The Maximum Flow Alternative ranks last in terms of annual fluctuation.

pgs. E-49 through E-51

~~**1.3.2.3 River- and Ocean-oriented Properties**~~

~~**Trinity River Basin.** Most of the reviewed literature focused on the property value effects of lakes as opposed to rivers; therefore, there was little to extrapolate from in attempting to discuss impacts on riverside properties. Of the river-oriented studies reviewed (Connor et al., 1973; Epp and Al-Ani, 1979; Rich and Moffitt, 1982; and Garrod and Willis, 1991), none of them dealt with the issue of fluctuating instream flows.~~

~~The flood control analysis illustrates the negative impacts to commercial and residential properties for instream flows above flood stage.~~

~~Methodology: The purpose of this section is to discuss the potential property value impacts of changing instream flows from the No Action Alternative levels to those levels suggested by the various alternatives. It is hypothesized that the relationship between increased instream flows up to the flood condition would have a positive influence on property values. Instream flows resulting in flood damages along certain sections of the Trinity River may simultaneously create positive effects elsewhere. Therefore, flood conditions may not automatically imply property value losses basinwide (minor flood damages in one location could be offset by widespread gains associated with higher flows).~~

[3] The 1945 water year reflects the first year after the reservoir filled.

~~Given the breakeven point in terms of flow levels between flood damages and property value benefits is unknown, we cannot speculate at what point flows result in negative property value effects basinwide. To avoid this issue, this analysis assumes mitigation for potentially flooded properties. As a result, this analysis focuses upon the more positive aspects associated with instream flows. Given the ambiguity involved in relating property values to instream flows, changes in salmon and steelhead populations and harvests as compared to the No Action Alternative are used to rank the alternatives.~~

~~While the estimated populations should only be considered moderately accurate, they were deemed reasonable for ranking alternatives. One of the purposes of greater instream flows is to help restore the native fisheries, implying potential recreational fishing benefits to property owners (another recreational benefit from higher instream flows may be improved boating conditions). While not every property owner is assumed to be an angler, the activity is quite popular among locals. As a result, increased fish populations are assumed to reflect a positive factor associated with living along the river. Sustainable fish populations and harvests are generally seen as one indicator of a "healthy" river. The conclusion was made that the movement toward a healthy river could manifest itself through increased natural fish populations and harvest, thereby positively affecting property values. Table E-49 presents information on Trinity River natural fish harvests by species and alternative, the change in population as compared to the No Action Alternative and existing conditions, and the relative rank. Since flow is just one factor influencing fish populations, separate fish harvests were estimated for alternatives with the same instream flow but different inriver and watershed habitat restoration activities.~~

~~Results: Reviewing harvest estimates by alternative, either for salmon or steelhead, results in the same overall ranking of the alternatives. The Maximum Flow Alternative ranks first, estimated to result in over 16,000 additional harvested fish as compared to the No Action Alternative. The Flow Evaluation Alternative is expected to be nearly as productive with over 13,000 additional fish harvested and, therefore, ranks a close second.~~

~~The Percent Inflow and Mechanical Restoration Alternatives represent a second tier in alternative ranking. Both alternatives are expected to result in additional harvests in the 2,000-4,000 range as compared to No Action. While still exceeding the No Action Alternative harvest, these alternatives fall considerably short of the harvest levels estimated for the Maximum Flow and Flow Evaluation Alternatives.~~

~~The State Permit Alternative results in zero inriver harvest and, therefore, ranks last.~~

~~No Action Alternative. This alternative ranks fifth out of the six alternatives, surpassing only the State Permit Alternative in expected inriver natural harvest.~~

~~Maximum Flow Alternative. This alternative ranks first, generating more inriver natural harvest than any other alternative. Total harvest estimated for this alternative is 10 times that of the No Action Alternative.~~

~~Flow Evaluation Alternative. Inriver natural harvests for the Preferred Alternative were estimated to be approximately equal to those of the Flow Evaluation Alternative. These alternatives rank a close second to the Maximum Flow Alternative, generating over 13,000 additional harvested fish compared to the No Action Alternative.~~

~~Percent Inflow Alternative. While this alternative ranks third, it is not nearly as productive as the Maximum Flow and Flow Evaluation Alternatives, generating only an additional 3,400 inriver natural harvested fish over the No Action Alternative.~~

~~Mechanical Restoration Alternative. This alternative ranks fourth, generating 2,000 additional inriver natural harvested fish compared to the No Action Alternative.~~

~~State Permit Alternative. By assuming zero harvest of inriver natural fish, this alternative clearly ranks last.~~

~~Existing Conditions versus Preferred Alternative. In contrast to the NEPA comparison of each alternative to the No Action Alternative, the state-required CEQA analysis compares the Preferred Alternative to existing conditions. The assumption was made by the fisheries team that harvest levels under existing conditions would be essentially equal to those estimated for the No Action Alternative. In addition, harvest levels for the Preferred Alternative were deemed to be equivalent with those estimated for the Flow Evaluation Alternative despite the additional watershed elements associated with the Preferred Alternative. As a result, the CEQA analysis of the Preferred Alternative is equivalent to the NEPA analysis of the Preferred Alternative. The Preferred Alternative is expected to generate over 13,000 additional inriver natural harvested fish as compared to existing conditions.~~

~~Lower Klamath River Basin/ Coastal Area. The lower Klamath River consists of the Yurok Tribe reservation. Due to the communal nature of tribal land ownership and management, individual property values are generally not of primary concern to tribal members; therefore, real estate impacts are not considered for this area.~~

~~Central Valley. Since the alternatives are not expected to create a perceptually significant change in instream flows, no discernible impact is expected for riverside residential properties.~~

pg. E-51 **(CHANGES FOLLOW)**

~~1.3.2.4~~ 1.3.2.3 Ranking Summary

Table E-~~50~~ 49 summarizes the overall ranks by alternative presented for the various reservoirs~~ and inriver reaches. Since the ranking of each alternative depends on the individual indicator, it is impossible to provide a clear overall rank for each alternative.~~

1.4 Bibliography *(NO CHANGE)*

2.4.5.1 Technical Appendix E—Tables and Figures

Tables

E-38 Gross Revenue in Percent Inflow Alternative as Compared to No Action Alternative *(NO CHANGE)*

E-39 Change in Net Revenue in Percent Inflow Alternative as Compared to No Action Alternative *(NO CHANGE)*

E-40 Irrigation Water Applied in Percent Inflow Alternative as Compared to No Action Alternative *(NO CHANGE)*

E-41 Irrigated Acreage in State Permit Alternative as Compared to No Action Alternative *(NO CHANGE)*

E-42 Gross Revenue in State Permit Alternative as Compared to No Action Alternative *(NO CHANGE)*

E-43 Change in Net Revenue in State Permit Alternative as Compared to No Action Alternative *(NO CHANGE)*

E-44 Irrigation Water Applied in State Permit Alternative as Compared to No Action Alternative *(NO CHANGE)*

E-45 Trinity Reservoir Property Value Impact Ranking—Full Year Comparison **(CHANGES FOLLOW)**

E-46 Trinity Reservoir Property Value Impact Ranking—High Recreation Season (May-September) Comparison **(CHANGES FOLLOW)**

E-47 Shasta Reservoir Property Value Impact Ranking—Full Year Comparison *(NO CHANGE)*

E-48 Shasta Reservoir Property Value Impact Ranking—High Recreation Season (May-September) Comparison *(NO CHANGE)*

~~E-49 Trinity River Property Value Impact Ranking~~

Table E-49 was deleted along with its supporting text, Section 1.3.2.3 River- and Ocean-oriented Properties.

E-~~49~~50 Property Value Impact NEPA Ranking Summary **(CHANGES FOLLOW)**

Table E-50 (now Table E-49) has been modified (in accordance with the text) to represent only reservoir-based property value rankings.

Figures

E-1 Trinity River Basin Land Ownership *(NO CHANGE)*

E-2 1990 Agricultural Land Use in the Central Valley and San Felipe Unit *(NO CHANGE)*

E-3 1990 Normalized Irrigated Acres and Central Valley Irrigation Water Deliveries by Source from 1985-1992 *(NO CHANGE)*

E-4 Flood Damage Study Site Locations *(NO CHANGE)*

Table E-18A
Municipal Water Supply Economics, Cumulative Impacts
Alternative Minus No Action Alternative [a]

	Sacramento Valley	Bay Area	San Joaquin Valley
Average Condition			
Demand (taf/yr)	0.0	0.0	0.0
Supplies (taf/yr)	(6.8)	(17.2)	(2.1)
Shortfall (taf/yr)	6.8	17.2	2.1
New Supplies (taf/yr)[a]	6.0	7.3	1.7
New Supply Cost (million $/yr)[b]	$1.1-1.9	$2.7-4.5	$0.4-$0.6
New Supply Cost $/af	0.00	$97-$161	$26-$44
Percent Retail Price Increase [c]	0.8%	0.6%	0.8%
Demand Reduction (taf/yr) [d]	0.9	0.7	0.3
New 2020 Demand (taf/yr)	(0.9)	(0.7)	(0.3)
Dry Condition (1928-1934 average hydrology)			
Demand (taf/yr)	(0.9)	(0.7)	(0.3)
Supplies (taf/yr)	(10.1)	(33.8)	(1.3)
Shortfall (taf/yr)	9.2	33.1	1.0
Percent RGO Shortage (minimum)[e]	1.28%	0.00%	0.44%
Percent RGO Shortage (maximum)[f]	2.72%	0.00%	0.44%
Shortfall Allocation (taf/yr)			
RGO Drought Conservation	9.2	0.0	1.0
Comm/Ind Drought Conservation[g]	0.0	0.0	0.0
Drought Supplies	0.0	33.1	0.0
Drought Cost (million $/yr)			
Drought Supplies[g]	$0.0	$48-$80	$0.0
Drought Conservation[h]	$0.2	$0.0	$0.0
Comm/Ind Economic Surplus[i]	$0.0	$0.0	$0.0
Comm/Ind Sales Revenue[j]	$0.0	$0.1	$0.0
RGO Economic Surplus	$2.4	$0.1	$0.2
RGO Sales Revenue	$1.6	$0.1	$0.1
Water Cost Savings[k]	($0.6)	($4.2)	($0.1)
Total Cost/yr (million $)[g]	$3.6	$45-$75	$0.2

[a]1997 dollars. Each region only includes the portion of the geographic region potentially affected.

[b]Supplies needed to achieve supply-demand balance. Cost measured at the treatment plant. Costs are plus or minus 25 percent to reflect uncertainty. In the Bay Area, new supplies are needed in just one subregion.

[c]Percent increase in retail price due to acquisition of more expensive supplies.

[d]Demand reduction caused by price increase.

[e]Percent mandatory drought conservation required of residential, government and "other" users (not commerce and industry). Minimum and maximum is the range for water provider groups within this region.

[f]Mandatory drought conservation in commercial/industrial sector is limited to 5 percent of demand.

[g]A range of plus or minus 25 percent is used to reflect uncertainty.

[h]Mandatory drought conservation program costs.

[I]Willingness to pay above water cost that is lost because of mandatory conservation.

[j]Sales revenue lost because of drought conservation.

[k]Costs of water supply saved because of shortage.

Table E-45
Trinity Reservoir Property Value Impact Ranking—Full Year Comparison

Reservoir Water Levels Data in each cell reflect: Item Value, Difference from No Action Alternative or Existing Conditions, and Rank (in parenthesis)	NEPA Comparison to No Action Alternative					CEQA Comparison to Existing Conditions	
	No Action/Mechanical Restoration Alternatives	Maximum Flow Alternative	Flow Evaluation Alternative	Percent Inflow Alternative	State Permit Alternative	Existing Conditions	Preferred Alternative
Drawdown							
Annual Average (average year):	~~2,298, 0, (4)~~ 2,302, 0, (3)	~~2,284, -14, (5)~~ 2,284, -18, (5)	~~2,303, +5, (2)~~ 2,303, +1, (2)	~~2,301, +3, (3)~~ 2,301, -1, (4)	~~2,311, +13, (1)~~ 2,311, +9, (1)	2,302	2,303, +1
Annual Fluctuation							
Annual Average (across water-year classes): High:	~~2,328, 0, (4)~~ 2,331, 0, (2)	~~2,299, -29, (5)~~ 2,299, -32, (5)	~~2,329, +1, (3)~~ 2,329, -2, (4)	~~2,330, +2, (2)~~ 2,330, -1, (3)	~~2,334, +6, (1)~~ 2,334, +3, (1)	2,331	2,329, -2
Low:	~~2,253, 0, (4)~~ 2,263, 0, (4)	~~2,269, +16, (3)~~ 2,269, +6, (3)	~~2,271, +18, (2)~~ 2,271, +8, (2)	~~2,275, +22, (1)~~ 2,275, +12, (1)	~~2,275, +22, (1)~~ 2,275, +12, (1)	2,265	2,271, +6
Range:	~~75, 0, (5)~~ 68, 0, (5)	~~30, -45, (1)~~ 30, -38, (1)	~~58, -17, (3)~~ 58, -10, (3)	~~55, -20, (2)~~ 55, -13, (2)	~~59, -16, (4)~~ 59, -9, (4)	66	58, -8
Annual Average (across individual years): High:	2,346, 0, (1)	2,331, -15, (2)	2,346, 0, (1)	2,346, 0, (1)	2,346, 0, (1)	2,346	2,346, 0
Low:	~~2,187, 0, (5)~~ 2,191, 0, (5)	~~2,229, +42, (1)~~ 2,229, +38, (1)	~~2,223, +36, (2)~~ 2,223, +32, (2)	~~2,221, +34, (3)~~ 2,221, +30, (3)	~~2,195, +8, (4)~~ 2,195, +4 (4)	2,192	2,223, +31
Range:	~~159, 0, (5)~~ 155, 0, (5)	~~102, -57, (1)~~ 102, -53, (1)	~~123, -36, (2)~~ 123, -32, (2)	~~125, -34, (3)~~ 125, -30, (3)	~~151, -8, (4)~~ 151, -4, (4)	154	123, -31
Annual Fluctuation - Overall Rank (rank sum – range):	10, (4)	2, (1)	5, (2)	5, (2)	8, (3)	n/ a	n/ a
Monthly Fluctuation							
Monthly Average (average year): High:	~~2,321, 0, (4)~~ 2,326, 0, (3)	~~2,293, -28, (5)~~ 2,293, -33, (5)	~~2,327, +6, (2)~~ 2,327, +1, (2)	~~2,322, +1, (3)~~ 2,322, -4, (4)	~~2,336, +15, (1)~~ 2,336, +10, (1)	2,327	2,327, 0
Low:	~~2,281, 0, (4)~~ 2,282, 0, (4)	~~2,275, -6, (5)~~ 2,275, -7, (5)	~~2,283, +2, (3)~~ 2,283, +1, (3)	~~2,284, +3, (2)~~ 2,284, +2, (2)	~~2,290, +9, (1)~~ 2,290, +8, (1)	2,282	2,283, +1
Range:	~~40, 0, (3)~~ 44, 0, (3)	~~18, -22, (1)~~ 18, -26, (1)	~~44, +4, (4)~~ 44, 0, (3)	~~38, -2, (2)~~ 38, -6, (2)	~~46, +6, (5)~~ 46, +2, (4)	45	44, -1
Monthly Average (across water-year classes): High:	~~2,358, 0, (4)~~ 2,366, 0, (2)	~~2,315, -43, (5)~~ 2,315, -51, (5)	~~2,359, +1, (3)~~ 2,359, -7, (4)	~~2,361, +3, (2)~~ 2,361, -5, (3)	~~2,367, +9, (1)~~ 2,367, +1, (1)	2,366	2,359, -7
Low:	~~2,213, 0, (5)~~ 2,218, 0, (5)	~~2,248, +35, (1)~~ 2,248, +30, (1)	~~2,236, +23, (2)~~ 2,236, +18, (2)	~~2,235, +22, (3)~~ 2,235, +17, (3)	~~2,227, +14, (4)~~ 2,227, +9, (4)	2,221	2,236, +15
Range:	~~145, 0, (5)~~ 148, 0, (5)	~~67, -78, (1)~~ 67, -81, (1)	~~123, -22, (2)~~ 123, -25, (2)	~~126, -19, (3)~~ 126, -22, (3)	~~140, -5, (4)~~ 140, -8, (4)	145	123, -22

Table E-45
Trinity Reservoir Property Value Impact Ranking—Full Year Comparison

Reservoir Water Levels **Data in each cell reflect: Item Value, Difference from No Action Alternative or Existing Conditions, and Rank (in parenthesis)**	**NEPA Comparison to No Action Alternative**					**CEQA Comparison to Existing Conditions**	
	No Action/Mechanical Restoration Alternatives	**Maximum Flow Alternative**	**Flow Evaluation Alternative**	**Percent Inflow Alternative**	**State Permit Alternative**	**Existing Conditions**	**Preferred Alternative**
Monthly Values (across all years): High:	2,369, 0, (1)	2,344, -25, (2)	2,369, 0, (1)	2,369, 0, (1)	2,369, 0, (1)	2,369	2,369, 0
Low:	~~2,165, 0, (5)~~ 2169, 0, (4)	~~2,208, +43, (1)~~ 2,208, +39, (1)	~~2,206, +41, (2)~~ 2,206, +37, (2)	~~2,203, +38, (3)~~ 2,203, +34, (3)	~~2,168, +3, (4)~~ 2,168, -1, (5)	2,169	2,206, +37
Range:	~~204, 0, (5)~~ 200, 0, (4)	~~136, -68, (1)~~ 136, -64, (1)	~~163, -41, (2)~~ 163, -37, (2)	~~166, -38, (3)~~ 166, -34, (3)	~~201, 3, (4)~~ 201, +1, (5)	200	163, -37
Monthly Range within Each Year (across all years) High:	~~145, 0, (4)~~ 167, 0, (4)	~~101, -44, (1)~~ 101, -66, (1)	~~126, -19, (3)~~ -126, -41, (3)	~~125, -20, (2)~~ 125, -42, (2)	~~174, +29, (5)~~ 174, +7, (5)	170	126, -44
Low:	~~31, 0, (4)~~ 25, 0, (2)	~~12, -19, (1)~~ 12, -13, (1)	~~26, -5, (3)~~ 26, +1, (3)	~~25, -6, (2)~~ 25, 0, (2)	~~31, 0, (4)~~ 31, +6, (4)	24	26, +2
Average:	~~61, 0, (3)~~ 66, 0, (5)	~~36, -25, (1)~~ 36, -30, (1)	~~60, -1, (2)~~ 60, -6, (2)	~~62, +1, (4)~~ 62, -4, (3)	~~64, +3, (5)~~ 64, -2 (4)	66	60, -6
Monthly Fluctuation - Overall Rank (rank sum - range/ average):	~~16, (4)~~ 17, (4)	4, (1)	~~10, (2)~~ 9, (2)	~~12, (3)~~ 11, (3)	~~18, (5)~~ 17, (4)	n/ a	n/ a
Rank Sum: Drawdown, Annual Fluctuation, Monthly Fluctuation	~~12, (4)~~ **11, (5)**	**7, (2)**	**6, (1)**	~~8, (3)~~ **9, (4)**	**8, (3)**	**n/a**	**n/a**

Table E-46
Trinity Reservoir Property Value Impact Ranking—High Recreation Season (May-September) Comparison

Reservoir Water Levels Data in each cell reflect: Item Value, Difference from No Action Alternative or Existing Conditions, and Rank (in parenthesis)		NEPA Comparison to No Action Alternative					CEQA Comparison to Existing Conditions	
		No Action/ Mechanical Restoration Alternatives	Maximum Flow Alternative	Flow Evaluation Alternative	Percent Inflow Alternative	State Permit Alternative	Existing Conditions	Preferred Alternative
Drawdown								
Annual Average (average year):		~~2,301, 0, (4)~~ 2,307, 0, (2)	~~2,281, -20, (5)~~ 2,281, -26, (4)	~~2,307, +6, (2)~~ 2,307, 0 (2)	~~2,306, +5, (3)~~ 2,306, -1, (3)	~~2,317, +16, (1)~~ 2,317, +10, (1)	2,307	2,307, 0
Annual Fluctuation								
Annual Average (across water-year classes):	High:	~~2,349, 0, (3)~~ 2,354, 0, (2)	~~2,298, -51, (5)~~ 2,298, -56, (5)	~~2,348, -1, (4)~~ 2,348, -6, (4)	~~2,351, +2, (2)~~ 2,351, -3, (3)	~~2,355, +6, (1)~~ 2,355, +1, (1)	2,354	2,348, -6
	Low:	~~2,233, 0, (5)~~ 2,242, 0, (5)	~~2,264, +31, (1)~~ 2,264, +22, (1)	~~2,261, +28, (2)~~ 2,261, +19, (2)	~~2,260, +27, (3)~~ 2,260, +18, (3)	~~2,259, +26, (4)~~ 2,259, +17, (4)	2,245	2,261, +16
	Range:	~~116, 0, (5)~~ 112, 0, (5)	~~34, -82, (1)~~ 34, -78, (1)	~~87, -29, (2)~~ 87, -25, (2)	~~91, -25, (3)~~ 91, -21, (3)	~~96, -20, (4)~~ 96, -16, (4)	109	87, -22
Annual Average (across individual years):	High:	2,357, 0, (1)	2,334, -23, (2)	2,357, 0, (1)	2,357, 0, (1)	2,357, 0, (1)	2,357	2,357, 0
	Low:	~~2,183, 0, (5)~~ 2,194, 0, (5)	~~2,220, +37, (2)~~ 2,220, +26, (2)	~~2,223, +40, (1)~~ 2,223, +29, (1)	~~2,219, +36, (3)~~ 2,219, +25, (3)	~~2,195, +12, (4)~~ 2,195, +1, (4)	2,194	2,223, +29
	Range:	~~174, 0, (5)~~ 163, 0, (5)	~~114, -60, (1)~~ 114, -49, (1)	~~134, -40, (2)~~ 134, -29, (2)	~~138 , -36, (3)~~ 138, -25, (3)	~~162, -12, (4)~~ 162, -1, (4)	163	134, -29
Annual Fluctuation—Overall Rank (rank sum-range):	High:	10, (5)	2,(1)	4, (2)	6, (3)	8, (4)	n/ a	n/ a
Monthly Fluctuation								
Monthly Average (average year):	High:	~~2,321, 0, (4)~~ 2,326, 0, (2)	~~2,288, -33, (5)~~ 2,288, -38, (5)	~~2,324, +3, (2)~~ 2,324, -2, (2)	~~2,322, +1, (3)~~ 2,322, -4, (3)	~~2,336, +15, (1)~~ 2,336, +10, (1)	2,327	2,324, -3
	Low:	~~2,283, 0, (4)~~ 2,287, 0, (2)	~~2,275, -8, (5)~~ 2,275, -12, (4)	~~2,285, +2, (3)~~ 2,285, -2, (3)	~~2,287, +4, (2)~~ 2,287, 0, (2)	~~2,295, +12, (1)~~ 2,295, +8, (1)	2,288	2,285, -3
	Range:	~~38, 0, (3)~~ 39, 0, (3)	~~13, -25, (1)~~ 13, -26, (1)	~~39, +1, (4)~~ 39, 0, (3)	~~35, -3, (2)~~ 35, -4, (2)	~~41, +3, (5)~~ 41, +2, (4)	39	39, 0
Monthly Average (across water-year classes):	High:	~~2,358, 0, (4)~~ 2,366, 0, (2)	~~2,305, -53, (5)~~ 2,305, -61, (5)	~~2,359, +1, (3)~~ 2,359, -7, (4)	~~2,361, +3, (2)~~ 2,361, -5, (3)	~~2,367, +9, (1)~~ 2,367, +1, (1)	2,366	2,359, -7
	Low:	~~2,213, 0, (5)~~ 2,218, 0, (5)	~~2,255, +42, (1)~~ 2,255, +37, (1)	~~2,236, +23, (2)~~ 2,236, +18, (2)	~~2,235, +22, (3)~~ 2,235, +17, (3)	~~2,227, +14, (4)~~ 2,227, +9, (4)	2,221	2,236, +15

Table E-46
Trinity Reservoir Property Value Impact Ranking—High Recreation Season (May-September) Comparison

Reservoir Water Levels **Data in each cell reflect: Item Value, Difference from No Action Alternative or Existing Conditions, and Rank (in parenthesis)**	**NEPA Comparison to No Action Alternative**					**CEQA Comparison to Existing Conditions**	
	No Action/ Mechanical Restoration Alternatives	**Maximum Flow Alternative**	**Flow Evaluation Alternative**	**Percent Inflow Alternative**	**State Permit Alternative**	**Existing Conditions**	**Preferred Alternative**
Range:	~~145, 0, (5)~~ 148, 0, (5)	~~50, -95, (1)~~ 50, -98, (1)	~~123, -22, (2)~~ 123, -25, (2)	~~126, -19, (3)~~ 126, -22, (3)	~~140, -5, (4)~~ 140, -8, (4)	145	123, -22
Monthly Values (across all years): High:	2,369, 0, (1)	2,338, -31, (2)	2,369, 0, (1)	2,369, 0, (1)	2,369, 0, (1)	2,369	2,369, 0
Low:	~~2,165, 0, (5)~~ 2,173, 0, (4)	~~2,208, +43, (2)~~ 2,208, +35, (2)	~~2,212, +47, (1)~~ 2,212, +39, (1)	~~2,206, +41, (3)~~ 2,206, +33, (3)	~~2,170, +5, (4)~~ 2,170, -3, (5)	2,173	2,212, +39
Range:	~~204, 0, (5)~~ 196, 0, (4)	~~130, -74, (1)~~ 130, -66, (1)	~~157, -47, (2)~~ 157, -39, (2)	~~163, -41, (3)~~ 163, -33, (3)	~~199, -5, (4)~~ 199, +3, (5)	196	157, -39
Monthly Range within Each Year (across all years): High:	~~67, 0, (2)~~ 68, 0, (2)	~~44, -23, (1)~~ 44, -24, (1)	~~77, +10, (4)~~ 77, +9, (4)	~~71, +4, (3)~~ 71, +3, (3)	~~82, +15, (5)~~ 82, +14, (5)	70	77, +7
Low:	~~8, 0, (2)~~ 14, 0, (2)	~~4, -4, (1)~~ 4, -10, (1)	~~20, +12, (5)~~ 20, +6, (4)	~~14, +6, (3)~~ 14, 0, (2)	~~17, +9, (4)~~ 17, +3, (3)	14	20, +6
Range:	~~38, 0, (2)~~ 41, 0, (3)	~~16, -22, (1)~~ 16, -25, (1)	~~41, +3, (3)~~ 41, 0, (3)	~~38, 0, (2)~~ 38, -3, (2)	~~43, +5, (4)~~ 43, +2, (4)	40	41, +1
Monthly Fluctuation - Overall Rank (rank sum - range/ average):	~~15, (4)~~ 15, (3)	4, (1)	~~11, (3)~~ 10, (2)	10, (2)	~~17, (5)~~ 17, (4)	n/ a	n/ a
Rank Sum: Drawdown, Annual Fluctuation, Monthly Fluctuation	~~13, (4)~~ **10, (4)**	~~7, (1)~~ **6, (1)**	~~7, (1)~~ **6, (1)**	**8, (2)**	~~10, (3)~~ **9, (3)**	**n/a**	**n/a**

~~Table E-49~~
~~Trinity River Property Value Impact Ranking~~

~~Alternatives~~	~~Inriver Salmon Harvest (Chinook & Coho)~~	~~Change from No Action/ Existing Conditions~~	~~Rank~~	~~Inriver Steelhead Harvest~~	~~Change from No Action/ Existing Conditions~~	~~Rank~~
~~NEPA Comparison to No Action Alternative~~						
~~No Action~~	~~820~~	~~0~~	~~5~~	~~1,000~~	~~0~~	~~5~~
~~Maximum Flow~~	~~7,800~~	~~+6,980~~	~~1~~	~~10,400~~	~~+9,400~~	~~1~~
~~Flow Evaluation/ Preferred Alternative~~	~~6,400~~	~~+5,580~~	~~2~~	~~8,700~~	~~+7,700~~	~~2~~
~~Percent Inflow~~	~~2,250~~	~~+1,430~~	~~3~~	~~3,000~~	~~+2,000~~	~~3~~
~~Mechanical Restoration~~	~~1,630~~	~~+810~~	~~4~~	~~2,200~~	~~+1,200~~	~~4~~
~~State Permit~~	~~0~~	~~-820~~	~~7~~	~~0~~	~~-1,000~~	~~6~~
~~CEQA Comparison to Existing Conditions~~						
~~Existing Conditions~~	~~820~~	~~0~~	~~n/a~~	~~1,000~~	~~0~~	~~n/a~~
~~Preferred Alternative~~	~~6,400~~	~~+5,580~~	~~n/a~~	~~8,700~~	~~+7,700~~	~~n/a~~

Table E-~~50~~ 49
Property Value Impact NEPA Ranking Summary

	Alternatives					
	No Action	**Maximum Flow**	**Flow Evaluation**	**Percent Inflow**	**Mechanical Restoration**	**State Permit**
Reservoir Ranking[a]						
Trinity River Basin - Trinity Reservoir	4	2	1	3 ~~(tie)~~	4	4 ~~(tie)~~
Central Valley - Shasta Reservoir	2	5	4	3	2	1
~~Rivers Ranking~~						
~~Trinity River Basin~~ ~~- Trinity River~~	~~5~~	~~1~~	~~2~~	~~3~~	~~4~~	~~6~~

[a]Data in each cell reflects overall ranks

2.4.5.2 Technical Appendix E—Attachments

E1 CVPM Output Files *(NO CHANGE)*

E2 Summary of Literature Review *(NO CHANGE)*

E3 Flood Damage Assessment of Proposed Trinity River Fish and Wildlife Restoration Flow Alternatives *(NO CHANGE)*

2.4.6 Technical Appendix F—Power Resources

1.1 No Action Alternative Compared to Trinity EIS/EIR Alternatives *(SEE SUBSECTIONS)*

1.1.1 Modeling Background *(NO CHANGE)*

1.1.2 Impact Assessment Methodology **(CHANGES FOLLOW)**

pg. F-2

The impacts associated with each alternative were viewed from the perspective of the change in available CVP power, rather than attempting to estimate the total cost of the power supply requirements for the CVP preference power customers under each of the various alternatives studied. The difference in on- and off-peak energy production and the differences in monthly firm load-carrying ~~generating~~ capability between the alternatives and the No Action Alternative was evaluated to estimate the impacts associated with each alternative.

1.1.2.1 CVP Operations *(NO CHANGE)*

1.1.2.2 Market Value of Power **(CHANGES FOLLOW)**

pg. F-3

The PROSYM electric production cost model used the output from the PROSIM model and power module to develop an estimate of the monthly ~~annual~~ change in the market value of CVP power production for each alternative, as compared to the No Action Alternative. The CVP energy generation and associated generating capacity availability under average and adverse dry hydrologic conditions were developed for use with PROSYM.

Energy ~~G~~generation in an average year was based on a monthly average of the generation at each CVP powerplant over the 69 years of simulation from the PROSIM model. For example, the average January generation at Shasta was the average of the Shasta generation in each of the 69 Januarys; the average February generation at Shasta was the average of the Shasta generation at each of the 69 Februarys; and so on. Average project use and available CVP generating capabilities at each powerplant were calculated using the same process.

To determine the dry-year generation and firm load-carrying capabilities ~~capacities~~ that provide a high level of system reliability, a level of hydroelectric production was chosen such that the CVP capacity would be available at least 90 percent of the time for any given month, barring equipment failure. To create this synthetic year, the energy generated in each month, over the 69-year simulation, was sorted into ascending order. A month and year were then selected such that the generation in that month would be exceeded 90 percent of the time. This was done by month such that the generation in the dry-year January would be exceeded in 90 percent of the Januarys, the generation in the dry-year February would be exceeded in 90 percent of the Februarys, and continued throughout the year. The capacity available from each powerplant and the required project use were defined to be the capacity and project use as reported by the PROSIM power model for each of the 90 percent exceedance months.

The resulting 12 months of adverse-year energy levels developed for the EIS/EIR alternative analysis comprise a synthetic year that does not resemble any specific operating or chronological year within the 69-year simulation period. Similarity to a specific hydrologic

year was not assumed to be important when the market value of the CVP capacity (i.e., level of capacity supported with energy) is being determined, since each month is evaluated independently of other months and the market will value the capacity available, and hence, the potential to offset additional capital expenditures in any month based on the applicable reliability criteria (i.e., 90 percent exceedance).

pg. F-4

Separation of capacity prices and energy prices have been eliminated within the current deregulated industry structure within California. Given that the current market structure has only been in place for about 14 months, it is difficult to clearly determine the price impact of capacity shortages on an ongoing basis. Therefore, this analysis assumes that the decrease in CVP firm load-carrying capacity will ultimately result in construction of new generating capacity.

pg. F-5

CVP power generation is predominantly peaking in nature, and the system is energy-constrained during adverse water conditions. For this reason and since long-term load resource balance was assumed, capacity from the CVP was valued based on the assumption that any change in the CVP power capacity would be offset by a corresponding change in the level of construction of combined-cycle combustion turbines. As a result of the industry restructuring, it was assumed that future capacity additions would be made by private generation companies and that very little public financing would be involved in future capacity additions. Based on these assumptions, the value of capacity was estimated to be $8.99 per kilowatt-month (1997 dollars). A detailed description of the assumptions regarding how the capacity value was estimated is presented in the TEIS Impacts Study conducted by Western (Western, 1999).

Capacity without energy (available capacity less capacity supported with energy) was also valued based on its ability to provide certain ancillary services, primarily ~~spinning~~ operating and installed reserves. The pricing history for these ancillary services in the new market environment has been very volatile, leading to substantial restructuring of these markets. Therefore, this analysis assumes to value ancillary service capacity at 20 percent of the value used for the capacity supported with energy. The value of energy produced by the CVP was estimated based on a marginal heat rate approach. To the extent that CVP power output is increased or decreased in a particular time period, an opposite change will occur in the output of the marginal unit that is operating at that same time.

1.1.3 Model Results *(SEE SUBSECTIONS)*

1.1.3.1 No Action Alternative (CHANGES FOLLOW)

pg. F-7

Power Generation. Simulated average annual generation at CVP powerplants in the Shasta and Trinity River Divisions for the 69-year simulation period is shown on Figure F-1 and presented in Table F-2. Simulated average annual generation at CVP powerplants in the American River and West San Joaquin Divisions for the 69-year simulation period is shown on Figure F-2 and presented in Table F-2. Total CVP power generation includes generation at Trinity Reservoir, Judge Francis Carr (Carr), Spring Creek Tunnel (Spring Creek), Shasta

Reservoir, Keswick Reservoir (Keswick), Folsom Lake, Lake Natoma (Nimbus), New Melones Lake, and San Luis Reservoir powerplants and adjustments for ~~includes estimated~~ transmission losses for delivery to Tracy. Simulated average monthly total CVP generation for the long-term average, calendar years 1922-1990, and dry period, calendar years 1929-1934, is shown on Figures F-3 and F-4 and presented in Table F-3. The average annual total CVP generation for the long-term average for the No Action Alternative is 5,169 gigawatt-hours (GWh). The average annual total CVP generation for the dry period for the No Action Alternative is 2,946 GWh.

pg. F-8

Market Value of Power. For the evaluation of the market value of ~~power~~energy, the long-term average energy available from PROSIM was used. The capacity values were based on the synthetic dry year discussed earlier in this section. PROSIM generation and Project Use values used in the synthetic year for the No Action Alternative analysis are presented in Tables F-10 through F-12. The annual energy available and capacity available for sale, based on the synthetic year, are presented in Table F-13. The average annual energy available for sale under the No Action Alternative is 3,779 GWh. Based on the 90 percent exceedance synthetic dry year, the average monthly capacity for sale with energy for the No Action Alternative is 747 MW and the average monthly capacity for sale without energy was 739 MW.

1.1.3.2 Maximum Flow Alternative **(CHANGES FOLLOW)**

pg. F-9

Market Value of Power. PROSIM generation and project use values used in the synthetic year for the Maximum Flow Alternative analysis are presented in Tables F-10 through F-12. The annual energy available and capacity available for sale, based on the synthetic year, are presented in Table F-13. The average annual energy available for sale decreases by 32 percent compared to the No Action Alternative, resulting in a reduction in energy value. Based on the 90 percent exceedance synthetic dry year, the average monthly capacity for sale with energy decreases by 10 percent, and the average monthly capacity for sale without energy increases by 3 percent. Table F-14 presents the change in the average annual market value of CVP power for the Maximum Flow Alternative as compared to the No Action Alternative. Based on the market value of power analysis, the net decrease in the value of CVP power production is approximately $26,036,000 per year. The allocation of the net decrease in the value of CVP power generation to the counties with preference power customers is presented in Table F-15. The cost of replacement power and the net effect on an "average" and a "high-allocation" Western customer is presented in Table F-16. A detailed discussion of the results of the value of power analysis is presented in the TEIS Impacts Study (Attachment F1).

1.1.3.3 Flow Evaluation Alternative **(CHANGES FOLLOW)**

pg. F-10

Market Value of Power. PROSIM generation and project use values used in the synthetic year for the Flow Evaluation Alternative analysis are presented in Tables F-10 through F-12. The annual energy available and capacity available for sale, based on the synthetic year, are presented in Table F-13. The average annual energy available for sale decreases by 7 percent compared to the No Action Alternative, resulting in a reduction in energy value.

Based on the 90 percent exceedance synthetic dry year, the average monthly capacity for sale with energy remains approximately the same, and the average monthly capacity for sale without energy increases by 8 percent. Table F-14 presents the change in the average annual market value of CVP power for the Flow Evaluation Alternative as compared to the No Action Alternative. Based on the market value of power analysis, the net decrease in the value of CVP power production is approximately $5,564,000 per year. The allocation of the net decrease in the value of CVP power generation to the counties with preference power customers is presented in Table F-15. The cost of replacement power and the net effect on an "average" and a "high-allocation" Western customer is presented in Table F-16.

1.1.3.4 Percent Inflow **(CHANGES FOLLOW)**
pg. F-11

Market Value of Power. PROSIM generation and project use values used in the synthetic year for the Flow Evaluation Alternative analysis are presented in Tables F-10 through F-12. The annual energy available and capacity available for sale, based on the synthetic year, are presented in Table F-13. The average annual energy available for sale decreases by 7 percent compared to the No Action Alternative, resulting in a reduction in energy value. Based on the 90 percent exceedance synthetic dry year, the average monthly capacity for sale with energy remains approximately the same, and the average monthly capacity for sale without energy increases by 8 percent. Table F-14 presents the change in the average annual market value of CVP power for the Flow Evaluation Alternative as compared to the No Action Alternative. Based on the market value of power analysis, the net decrease in the value of CVP power production is approximately $5,564,000 per year. The allocation of the net decrease in the value of CVP power generation to the counties with preference power customers is presented in Table F-15. The cost of replacement power and the net effect on an "average" and a "high-allocation" Western customer is presented in Table F-16.

1.1.3.5 State Permit Alternative **(CHANGES FOLLOW)**
pg. F-12

Market Value of Power. PROSIM generation and project use values used in the synthetic year for the State Permit Alternative analysis are presented in Tables F-10 through F-12. The annual energy available and capacity available for sale, based on the synthetic year, are presented in Table F-13. The average annual energy available for sale increases by 5 percent compared to the No Action Alternative, resulting in a reduction in energy value. Based on the 90 percent exceedance synthetic dry year, the average monthly capacity for sale with energy remains approximately the same, and the average monthly capacity for sale without energy increases by 3 percent. Table F-14 presents the change in the average annual market value of CVP power for the State Permit Alternative as compared to the No Action Alternative. Based on the market value of power analysis, the net increase in the value of CVP power production is approximately $5,937,000 per year. The allocation of the net increase in the value of CVP power generation to the counties with preference power customers is presented in Table F-15. The cost of replacement power and the net effect on an "average" and a "high-allocation" Western customer is presented in Table F-16.

1.1.4 Criteria for Determining Significance **(CHANGES FOLLOW)**
pg. F-13

A significant power resource related impact was determined to occur when the implementation of an alternative would result in:

- A reduction in the dry year firm load-carrying capacity (CVP hydroelectric capacity supported with CVP hydroelectric energy available for sale) to preference customers of 50 MW or greater occurring during January, February, March, June, July, August, September, or December
- A reduction of 5 percent or more in the annual energy available for sale to preference customers during an average year
- A reduction of 5 percent or more in the average energy available for sale to preference customers during any month of an average year
- Any decrease in the value of CVP power resulting in an increase in a preference customer's average power cost by $0.50 per MWh

1.2 Existing Conditions Compared to the Flow Evaluation Alternative *(NO CHANGE)*
1.2.1 Modeling Background *(NO CHANGE)*
1.2.2 Impact Assessment Methodology *(NO CHANGE)*
1.2.2.1 CVP Operations *(NO CHANGE)*
1.2.3 Model Results *(NO CHANGE)*
1.2.3.1 Existing Conditions *(NO CHANGE)*
1.2.3.2 Flow Evaluation Alternative *(NO CHANGE)*

1.3 References *(NO CHANGE)*

2.4.6.1 Technical Appendix F—Tables and Figures

Tables

Figures

2.4.6.2 Technical Appendix F—Attachments

F1 TEIS Impacts Study (Western, 1999) *(NO CHANGE)*

2.4.7 Technical Appendix G—Socioeconomics and Environmental Justice

SOCIOECONOMICS (SEE SUBSECTIONS)
INTRODUCTION (NO CHANGE)
AFFECTED ENVIRONMENT (NO CHANGE)
TRINITY RIVER BASIN (NO CHANGE)
LOWER KLAMATH RIVER BASIN/COASTAL AREA (NO CHANGE)
CENTRAL VALLEY (NO CHANGE)
ENVIRONMENTAL CONSEQUENCES (NO CHANGE)
METHODOLOGY AND IMPACT EVALUATION CRITERIA (NO CHANGE)
NO ACTION ALTERNATIVE (NO CHANGE)

Maximum Flow Alternative **(CHANGES FOLLOW)**

Trinity River Basin

Annual Impacts
pg. 99

***2020 Economic Impacts*.—**Under the Maximum Flow Alternative, the Trinity Shasta County regional economy would be negatively affected by decreases in spending associated with water-oriented recreation. Although recreation-related spending associated with use of the Trinity River would increase, these effects would be more than offset by decreases in recreation-related spending associated with use of Trinity and Shasta Reservoirs. Annual regional economic output would decrease by an estimated ~~$6.3~~ 6.6 million, place of work income by $~~2.6~~ 2.7 million, and employment by ~~66~~ 70 jobs (Table TA-54). These changes are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase $2.0 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by ~~39~~ 41 jobs, with ~~25~~ 26 of those occurring in the retail trade sector. These impacts are not considered substantial. Businesses that primarily cater to persons recreating at Trinity and Shasta Reservoirs, or along the Trinity River, would be most impacted by this alternative. These businesses include concessionaires, marina operators and other service providers at the lakes, and guiding and recreation services along the river. Adverse, but not substantial, impacts would be experienced by businesses that serve recreationists at Trinity and Shasta Reservoirs. Businesses that primarily serve persons recreating along the Trinity River would experience a substantial positive impact.

FLOW EVALUATION ALTERNATIVE **(CHANGES FOLLOW)**

Trinity River Basin

Annual Impacts
pg. 106

***2020 Economic Impacts*—**Under the Flow Evaluation Alternative, the Trinity/ Shasta County regional economy would be positively affected by increases in spending associated with increases in water-oriented recreation. Recreation-related spending associated with increases in use of the Trinity River and Trinity Reservoir would more than offset the

decreases in recreation-related spending associated with projected declines in use at Shasta Reservoir. Annual regional economic output would increase by an estimated $~~3.2~~ 3.0 million, place of work income would increase by $~~2.0~~ 1.8 million, and employment would increase by ~~66~~ 62 jobs (Table TA-54). These increases are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase $1.7 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to increase by ~~43~~ 41 jobs, with ~~41~~ 39 of those occurring in the retail trade and lodging sectors. These impacts are not considered substantial.

PERCENT INFLOW ALTERNATIVE **(CHANGES FOLLOW)**

Trinity River Basin

Annual Impacts
pg. 112

2020 Economic Impacts.—Under the Percent Inflow Alternative, the Trinity/ Shasta County regional economy would be negatively affected by decreases in spending associated with declines in water-oriented recreation. Although recreation-related spending associated with use of Trinity Reservoir would increase, these effects would be more than offset by decreases in recreation-related spending associated with declines in use at Shasta Reservoir and along the Trinity River. Annual regional economic output would decrease by an estimated $~~500,000~~ 800,000, place of work income would decrease by $~~300,000~~ 400,000, and employment would decrease by ~~8~~ 12 jobs (Table TA-54). These decreases, however, are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase by less than $10,000 annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by ~~5~~ 7 jobs, with ~~3~~ 4 of those occurring in the retail trade sector. These impacts are not considered substantial.

MECHANICAL RESTORATION ALTERNATIVE **(CHANGES FOLLOW)**

Trinity River Basin

Annual Impacts
pg. 117

2020 Economic Impacts—The Trinity/ Shasta County regional economy would be positively affected by the Mechanical Restoration Alternative. The only changes in recreation-related spending would be associated with slight increases in use of the Trinity River for sportfishing. Annual regional economic output would increase by an estimated $~~110,000~~ 130,000, place of work income would increase by $~~60,000~~ 70,000, and employment would increase by 2 jobs (Table TA-54). These increases are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase by less than $50,000 annually.

STATE PERMIT ALTERNATIVE

Trinity River Basin

Annual Impacts
pg. 121

2020 Economic Impacts—Under the State Permit Alternative, the Trinity/ Shasta County regional economy would be negatively affected by decreases in spending associated with declines in Trinity River recreation. Although recreation-related spending associated with use of Trinity and Shasta Reservoirs would increase, these effects would be more than offset by decreases in recreation-related spending along the Trinity River. Annual regional economic output would decrease by $~~5.9~~ 6.2 million, place of work income would decrease by $~~3.5~~ 3.6 million, and employment would decrease by ~~115~~ 119 (Table TA-54) jobs. These changes are not substantial. Revenues specific to businesses in Trinity County are estimated to decrease by $1.8 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by ~~74~~ 76 jobs, with ~~70~~ 72 of those occurring in the retail trade and lodging sectors. The adverse impacts on the lodging sector are substantial.

NO ACTION VERSUS PREFERRED ALTERNATIVE *(NO CHANGE)*

EXISTING CONDITIONS VERSUS PREFERRED ALTERNATIVE **(CHANGES FOLLOW)**

Trinity River Basin

Economic Impacts
pg. 128

Annual Impacts.—Under the Preferred Alternative, the Trinity/ Shasta County regional economy would be positively affected by increases in spending associated with increases in water-oriented recreation. Annual regional economic output would increase by $2.6 billion, place of work income would increase by $~~1.4~~ 1.5 billion, and employment would increase by 35,900 jobs (Table TA-54). More than 99 percent of these changes in economic activity are attributable to the effects of increased population on recreation use and spending associated with the Trinity River and Trinity and Shasta Reservoirs. Project-related effects are not substantial.

Table TA-54 has been modified to more accurately represent annual impacts under each alternative. Table TA-55 has been modified to more accurately represent the data pertaining to the Northern/Central Oregon Coastal Area. See Section 2.4.7.1 for revised Tables TA-54 and TA-55.

ENVIRONMENTAL JUSTICE	*(NO CHANGE)*
AFFECTED ENVIRONMENT	*(NO CHANGE)*
ENVIRONMENTAL CONSEQUENCES	*(NO CHANGE)*
METHODOLOGY	*(NO CHANGE)*
NO ACTION	*(NO CHANGE)*
MAXIMUM FLOW	*(NO CHANGE)*
FLOW EVALUATION/PREFERRED ALTERNATIVE	*(NO CHANGE)*
PERCENT INFLOW	*(NO CHANGE)*
MECHANICAL RESTORATION	*(NO CHANGE)*
STATE PERMIT	*(NO CHANGE)*
EXISTING CONDITIONS VERSUS PREFERRED ALTERNATIVE	*(NO CHANGE)*

2.4.7.1 Technical Appendix G—Tables

Tables—Socioeconomics

TA-1	Economic Regions by County	*(NO CHANGE)*
TA-2a	Employment Data for Trinity River Basin	*(NO CHANGE)*
TA-2b	Employment Data for Lower Klamath River Basin/ Coastal Area Region, 1992	*(NO CHANGE)*
TA-3	1991 Existing Conditions Data for the San Francisco Bay Region, Million 1997 Dollars	*(NO CHANGE)*
TA-4	Subregional Distribution of the California and Oregon Ocean Commercial Salmon Harvest in 1996	*(NO CHANGE)*
TA-5	Employment Data for Central Valley Regions, 1991	*(NO CHANGE)*
TA-6	1991 Existing Conditions Data for the Sacramento River Region, Million 1997 Dollar	*(NO CHANGE)*
TA-7	1991 Existing Conditions Data for the San Joaquin River Region, Million 1997 Dollars	*(NO CHANGE)*
TA-8	1991 Existing Conditions Data for the Tulare Region, Million 1997 Dollars	*(NO CHANGE)*
TA-9	Impact Thresholds by Analysis Type and Region	*(NO CHANGE)*
TA-10	Spawning Gravel Cost Comparison	*(NO CHANGE)*
TA-11	Total Costs by Alternative	*(NO CHANGE)*
TA-12	Cost Comparison to No Action Alternative	*(NO CHANGE)*
TA-13	Dam Modification Construction Costs by Alternative	*(NO CHANGE)*
TA-14	Summary of Trinity County Costs	*(NO CHANGE)*
TA-14a1	Construction Costs for New River Restoration Sites – Construction costs for the new river rehabilitation sites are defined as temporary annual costs	*(NO CHANGE)*
TA-14a2	Construction Costs for New River Restoration Sites – Annual construction costs for years 4 and 5 ($2,100,000 of construction costs would be incurred annually comprised of 7 channel restoration sites at $300,000 each)	*(NO CHANGE)*
TA-14a3	Construction Costs for New River Restoration Sites – Annual construction costs for year 6 ($1,800,000 of construction costs would be incurred annually comprised of 6 channel restoration sites at $300,000 each)	*(NO CHANGE)*
TA-14b	page 41	*(NO CHANGE)*

TA-29a	Ocean Salmon Sport Fishing Spending: North/ Central Oregon Region	*(NO CHANGE)*
TA-29b	Ocean Salmon Sport Fishing Spending: KMZ-Oregon Region	*(NO CHANGE)*
Tz-29c	Ocean Salmon Sport Fishing Spending: KMZ-CA Region	*(NO CHANGE)*
TA-29d	Ocean Salmon Sport Fishing Spending: Mendocino Region	*(NO CHANGE)*
TA-29e	Ocean Salmon Sport Fishing Spending: San Francisco Region	*(NO CHANGE)*
TA-29f	Ocean Salmon Sport Fishing Spending: Monterey Region	*(NO CHANGE)*
TA-30	Estimated Average Annual Harvesting Sector Gross Revenues under No-Action and With-Project Conditions	*(NO CHANGE)*
TA-31	Direct Effects on Regional Economics from Hydropower, Change to Personal Consumption Expenditure, Million $ Annually	*(NO CHANGE)*
TA-32	Direct Effects on Regional Economics from M&I Water Costs, Change to Personal Consumption Expenditure, Million $ Annually	*(NO CHANGE)*
TA-33	Direct Effects on Regional Economics from Agricultural Sector, Million $ Annually	*(NO CHANGE)*
TA-34	No Action Alternative Economic Levels, Bay Region, Year 2020, 1997 Dollars	*(NO CHANGE)*
TA-35	No Action Alternative Economic Levels, Sacramento River Region, Year 2020, 1997 Dollars	*(NO CHANGE)*
TA-36	No Action Alternative Economic Levels, San Joaquin River Region, Year 2020, 1997 Dollars	*(NO CHANGE)*
TA-37	No Action Alternative Economic Levels, Tulare Lake Region, Year 2020, 1997 Dollar	*(NO CHANGE)*
TA-38	Economic Impacts of Maximum Flow Alternative, Bay Region, by Industry	*(NO CHANGE)*
TA-39	Economic Impacts of Maximum Flow Alternative, Sacramento Region, by Industry	*(NO CHANGE)*
RM-40	Economic Impacts of Maximum Flow Alternative, San Joaquin Region, by Industry	*(NO CHANGE)*
TA-41	Economic Impacts of Maximum Flow Alternative, Tulare Region, by Industry	*(NO CHANGE)*
TA-42	Economic Impacts of Flow Evaluation Alternative, Bay Region by Industry	*(NO CHANGE)*
TA-43	Economic Impacts of Flow Evaluation Alternative, Sacramento Region, by Industry	*(NO CHANGE)*

Tables—Environmental Justice

TABLE TA-54
Trinity River Basin Region (Defined as Trinity County for Up-front Impacts, and Trinity and Shasta Counties for Annual Impacts ~~These Analyses~~)

Time of Impact/ Impact Measures/ Economic Sectors	Units	Comparison Bases: Existing Conditions	Comparison Bases: No Action Alternative	Action Alternatives: Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Up-front Impacts		**Year 1995 Totals**	**Year 2001 Totals**							
Output/Sales	M$	344.2	350.6	6.2/5.5/3.6[a]	1.28	1.23	2.14	0	2.14	8.54
Income	M$	186.1	189.5	2.95/2.65/1.75[a]	0.66	0.63	1.11	0	1.10	4.5
Employment	Jobs	4,955	5,045	77/70/45[a]	22	21	37	0	37	127
Most Impacted Sectors:										
Construction	Jobs	375	380	18/16/11	0	0	0	0	0	5
Wholesale trade	Jobs	105	105	7/6/4[a]	1	1	2	0	2	2
Eating & drinking	Jobs	225	230	8/7/4[a]	3	3	5	0	5	10
Auto & service stations	Jobs	55	55	11/10/6[a]	0	0	0	0	0	0
Annual Impacts		**Year 1995 Totals**	**Year 2020 Totals**							
Output/Sales	M$	6,078.2	8,693.7	~~-6.3~~ -6.6	~~3.2~~ 3.0	~~-0.5~~ -0.8	~~-0.11~~ 0.13	~~-5.9~~ -6.2	~~3.2~~ 3.0	~~2,618.7~~ 2,618.5
Income	M$	3,377.4	4,830.7	~~-2.6~~ -2.7	~~2.0~~ 1.8	~~-0.3~~ -0.4	~~-0.06~~ 0.07	~~-3.5~~ -3.6	~~2.0~~ 1.8	~~1,455.3~~ 1,455.1
Employment	Jobs	83,280	119,110	~~-66~~ -70	~~66~~ 6.2	~~-8~~ -12	2	~~-115~~ -119	~~66~~ 62	~~35,896~~ 35,892
Most Impacted Sectors:										
Wholesale trade	Jobs	4,900	7,010	-9	2	-1	0	-4	2	2,112
Retail trade	Jobs	15,880	22,710	~~-25~~ -26	~~21~~ 20	~~-3~~ -4	1	~~-38~~ -39	~~21~~ 20	~~6,851~~ 6,850
Lodging places	Jobs	1,440	2,060	~~-5~~ -6	~~20~~ 19	~~-1~~ -2	1	~~-32~~ -33	~~20~~ 19	~~640~~ 639

[a]Three estimates reflect dam modification options. See Section 2.1.3.
M$ = million dollars.

TABLE TA-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Monterey Coastal Area										
Total output	M$	34,214.6	51,714.2	0	0	0	0	-13.3	0	17,499.6
Income	M$	19,297.0	29,166.8	0	0	0	0	-5.4	0	9,869.8
Employment	Jobs	473,210	715,190	0	0	0	0	-166	0	241,980
Most Impacted Sectors:										
Commercial fishing	Jobs	210	210	0	0	0	0	-27	0	0
Seafood processing	Jobs	2,450	2,450	0	0	0	0	-57	0	0
Wholesale trade	Jobs	18,920	28,600	0	0	0	0	-8	0	9,680
Retail trade	Jobs	77,010	116,390	0	0	0	0	-24	0	39.380
Lodging places	Jobs	12,390	18,720	0	0	0	0	-2	0	6,330
San Francisco Coastal Area										
Total output	M$	351,700	430,900	-159.6	-32.6	-12.3	2.28	13.2	-32.6	79,167
Income	M$	199,900	245,000	-79.2	-16.2	-6.4	0.91	7.9	-16.2	45,084
Employment	Jobs	3,652,600	4,560,500	-1,540	-310	-120	25	110	-310	907,590
Most Impacted Sectors:										
Vegetables	Jobs	1,423	1,776	-165	-1	-9	0	27	-1	352
Canned fruit and vegetables	Jobs	3,281	4,097	-125	-24	-7	0	21	-24	792
Retail and wholesale trade	Jobs	746,600	932,218	-327	-65	-30	6	21	-65	185,553
Services	Jobs	1,154,925	1,441,977	-420	-85	-41	6	38	-85	286,967
Commercial Fishing	Jobs	1,276	1,593	3	0	-3	3	-20	0	317
Mendocino Coastal Area										
Total output	M$	3,111.5	4,267.1	11.1	9.6	4.9	4.3	-2.1	9.6	1,165.2
Income	M$	1,560.4	2,140.0	5.1	4.4	2.3	2.0	-1.0	4.4	584.0
Employment	Jobs	43,630	59,835	127	110	57	50	-25	110	16,315

TABLE TA-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Most Impacted Sectors:										
Commercial fishing	Jobs	180	180	33	29	14	13	-5	29	29
Seafood processing	Jobs	180	180	31	27	13	12	-5	27	27
Wholesale trade	Jobs	1,360	1,870	6	5	3	2	-1	5	515
Retail trade	Jobs	8,130	11,150	18	15	8	7	-5	15	3,035
Lodging places	Jobs	1,710	2,350	2	2	1	1	-1	2	642
KMZ-California Coastal Area										
Total Output	M$	5,086.9	6,072.5	3.0	2.9	2.0	1.9	-0.3	2.9	988.5
Income	M$	2,752.4	3,285.7	1.5	1.5	1.0	0.9	-0.2	1.5	534.8
Employment	Jobs	73,760	88,050	37	36	24	23	-4	36	14,326
Most Impacted Sectors:										
Commercial fishing	Jobs	520	520	8	7	5	5	-1	7	7
Seafood processing	Jobs	460	460	7	6	4	4	-1	6	6
Wholesale trade	Jobs	3,210	3,830	2	2	2	1	0	2	622
Retail trade	Jobs	13,820	16,490	8	8	5	5	-1	8	2,678
Lodging places	Jobs	1,390	1,650	2	2	1	1	0	2	262
KMZ-Oregon Coastal Area										
Total Output	M$	572.4	848.4	3.9	3.7	2.8	2.6	-0.5	3.7	279.7
Income	M$	289.9	429.7	1.7	1.6	1.2	1.0	-0.2	1.6	141.4
Employment	Jobs	9,100	13,490	62	58	45	43	-8	58	4,448
Most Impacted Sectors:										
Commercial fishing	Jobs	130	130	13	12	9	8	-1	12	12
Seafood processing	Jobs	110	110	9	8	6	6	-1	8	8
Wholesale trade	Jobs	330	490	4	3	3	3	0	3	163
Retail trade	Jobs	2,080	3,080	18	17	14	13	-3	17	1,017
Lodging places	Jobs	500	740	3	3	3	2	-1	3	243

TABLE TA-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Northern/Central Oregon Coastal Area										
Total output	M$	20,757.5	27,094.0	~~50.6~~ 51.1	~~47.1~~ 47.5	~~35.6~~ 36.0	~~35.4~~ 35.7	~~-41.3~~ -41.8	~~47.1~~ 47.5	~~6,383.6~~ 6,384.0
Income	M$	10,549.2	13,768.8	~~19.0~~ 19.3	~~17.7~~ 17.9	~~13.4~~ 13.6	~~13.2~~ 15.4	~~-15.5~~ -15.8	~~17.7~~ 17.9	~~3,237.3~~ 3,237.5
Employment	Jobs	290,960	379,760	~~593~~ 601	~~552~~ 559	~~418~~ 423	~~413~~ 419	~~-484~~ -494	~~552~~ 559	~~89,352~~ 89,559
Most Impacted Sectors:										
Commercial fishing	Jobs	900	900	109	102	77	74	-89	102	102
Seafood processing	Jobs	1,730	1,730	181	168	127	127	-147	168	168
Wholesale trade	Jobs	11,260	14,700	36	34	26	26	-30	34	3,474
Retail trade	Jobs	56,410	73,630	~~88~~ 92	~~82~~ 86	~~62~~ 65	~~61~~ 64	~~-73~~ -77	~~82~~ 86	~~17,302~~ 17,306
Lodging places	Jobs	6,370	8,320	~~5~~ 6	5	4	4	~~-4~~ -5	5	1,955

M$ = million dollars.

2.4.8 Technical Appendix H—Air Quality

1.1	**Air Quality**	*(NO CHANGE)*
1.1.1	**Climate**	*(NO CHANGE)*
1.1.2	**Air Quality Standards**	*(NO CHANGE)*
1.1.3	**Environmental Consequences**	*(NO CHANGE)*
1.1.4	**Mitigation**	*(NO CHANGE)*

2.4.8.1 Technical Appendix H—Tables

H-1	Representative Historical Climate Data in Proximity to Project Site	*(NO CHANGE)*
H-2	State of California and National Ambient Air Quality Standards	*(NO CHANGE)*
H-3	Summary of Monitored PM_{10} Data at Visalia—North Church Street Station	*(NO CHANGE)*
H-4	Air Quality Thresholds of Significance	*(NO CHANGE)*
H-5	Emission Estimates for Regular (non-construction) Operations for each Alternative	*(NO CHANGE)*
H-6	Summary of Each Alternative's Potential Significant Impacts	*(NO CHANGE)*

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Chapter 4
Appendices

Appendix A
DEIS/EIR Distribution Report and FEIS/EIR Distribution List

APPENDIX A

DEIS/EIR Distribution Report and FEIS/EIR Distribution List

DEIS/EIR Distribution Report

United States Senate and House of Representatives

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- Dianne Feinstein

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- Calvin Dooley
- John Doolittle
- Wally Herger
- Steve Lanich, Committee on Resources
- Robert T. Matsui
- George Miller
- Doug Ose
- Richard W. Pombo
- George Radanovich
- Robert Smith
- William M. Thomas
- Mike Thompson

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U.S. Department of Agriculture

Forest Service
- L. Everest
- Ralph Phipps, Environmental Coordinator

Natural Resources Conservation Service
- J. Spear, Soil Conservation Service
- L. A. Brooks

Six Rivers National Forest, Carolyn Cook

U.S. Department of Commerce

National Marine Fisheries Service
- Don Reck
- Gary Stern
- Robert Ziobro

U.S. Department of Defense

U.S. Army Corps of Engineers, Jane Hicks

U.S. Department of Energy

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Western Area Power Administration, Nanette Englebrite, Water Management

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- S. Bergstrom
- John Bezdek
- S. Blackwell
- D. Cottingham
- Anne Crichton
- B. Geigle
- David Hayes
- Nancy Hayes
- D. Jacobsen
- Jim Monroe
- P.S. Port
- H. Sibbison
- Holly Wheeler
- Michael Young

Bureau of Indian Affairs, R. Fieltz

Bureau of Land Management
- Karl Stein
- Eric Morgan
- C. Schultz

Bureau of Reclamation
- Gary Baker
- Susan Black
- Donna Darr
- Frank Michny
- Jon Platt
- Russell Smith
- Edward Solbos
- B. Sullivan
- Ramona Swafford
- Lenore Thomas

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Tom DH Kisanuki
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Marion Moe

CALFED Bay-Delta Program
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Mark Cowin

California Department of Fish and Game
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- N. Manji
- Mark Stopher
- Michael Wallace

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California Department of Transportation, Larry Moore

California Department of Water Resources
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- Ralph Hinton
- B. Mendenhall
- Ted Thomas

California Regional Water Quality Control Board
- Central Valley Region, D. Wilson
- Northern California Region, Lee Michlin

California State Clearinghouse

California State Water Resources Control Board, M. Falkenstein

California State Land Commission, D. Sanders

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Hoopa Valley Newspaper, Kristi Shelloner
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Hoopa Valley Tribe, Mike Orcutt
Karuk Tribe, Chairman
Karuk Tribe
- R. Pierce
- R. Rohde

Klamath Tribe of Oregon, Chairman
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Six Rivers National Forest, Carolyn Cook

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- L. A. Brooks

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- Gary Stern
- Robert Ziobro

[a] The individuals marked with an asterisk (*) specifically requested a copy of the FEIS/EIR in their comment letters. The other individuals listed either requested a copy of the DEIS/EIR and/or sent in a comment letter.

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Senate District 4, Senator K. Maurice Johannessen
Speaker of the Assembly, K. Kashkooli
Subcommittee on Water and Power, Robert Fabor

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Bernard Aguilar
Ryan Broddick, Chief Deputy Director
Robert Hight, Director

N. Manji
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Michael Wallace

California Department of Forestry and Fire Protection, Bill Stewart

California Department of Transportation
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Northern California Region, Lee Michlin

California Resources Agency, Mary Nichols

California State Water Resources Control Board, M. Falkenstein

California State Land Commission, D. Sanders

Governor's Office of Planning and Research, California State Clearinghouse, Terry Roberts

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Hoopa Valley Tribe, Chairman
Hoopa Valley Tribe, Fisheries Department, James Wroble
Hoopa Valley Tribe, Mike Orcutt
Karuk Tribe, Chairman
Karuk Tribe
R. Pierce
R. Rohde
Klamath Tribe of Oregon, Chairman
Modoc-Lassen Indian Housing Authority, Phil Bush
Nor-Rel-Muk Nation, Raymond Patton, Tribal Chair
Yurok Tribe, Chairman
Yurok Tribe
Troy Fletcher
Dave Hillemeier
Susan Masten
Charlie Chamberlain

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Northwestern University, Paul Friesema, Environmental Policy Program

University of California-Davis, Mark Grismer, LAWR Hydrology*

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Willows Public Library
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National Clearinghouse Library
U.S. Bureau of Reclamation Library, Dorie McDonald
University of California-Berkeley, Water Resources Center Archive
University of California, Government Information Shields Library, Marcia Meister
U.S. Geological Survey Library, Nancy Blair

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Eureka, CA
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CAL-Trout
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Friends of the Trinity, Byron Leydecker, Chair
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Maidu Group of the Mother Lode Chapter, Alice Q. Howard, Conservation Chair
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East Bay Municipal Utility District, Judith A. Garland
Glenn-Colusa Irrigation District, Don Bransford
Metropolitan Water District of Southern California, Rick Sipps
Modesto Irrigation District, William R. Johnston
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Placer County Water Agency, Stephen Jones
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California Urban Water Agencies, Byron M. Buck, Executive Director
Central Valley Project Water Association
Jason Peltier, Manager
Humboldt Fish Marketing Association, Ken Bay
Northern California Water Association, Dan Keppen, Member and Government Relations
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Jim DeStaso*
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Bill Devall*
Daniel M. Dooley*
Dane Durham*

EDAW, Inc., David Blau*

Felger & Associates, Warren Felger*
Roger Fontes*
Dennis Fox

Janet K. Goldsmith*

Terrence Hollingworth*

Drake Johnson*
Nathan Joyner*

Greg Kamman
Kier Associates, Bill Kier*
Kronick, Moskovitz, & Tiedemann*
Carol Krueger*

Chuck Lane*
N.S. Lomba*

Roger Mann
Scott McBain
George McColm*
Daniel A. McDaniel*
Joe Membrino
Joe Mercien*
Don Miller*
Tom Mills*
Pat Minturn*
Montgomery Watson, Vanessa Nishikawa
Jim Moose

Denver Nelson

Jim Parker*
Stephen Passek*

John Reuben
William A. Richards*
Wayne JRose*
Tim Roth*

Paul Scheuerman
Gary Seput*
Simpson Timber, T. O'Dell*
Felix E. Smith*
Frank R. Stolten*
Surface Water Resources, Linda Standler*
Dee E. Swearingen

Dan Viele

Greg Wang*
John Ward*
Bob Webster*
Thomas Wegge
Richard A. Welsh*
Kevin Wolf*
M.H. Wolf*

Appendix B
Biological Assessment

APPENDIX B

Biological Assessment

The information comprising the Biological Assessment (BA) consists generally of information drawn from previously circulated public documents, such as the *Central Valley Project Improvement Act Programmatic Environmental Impact Study* and the *Trinity River Flow Evaluation Study*, and the results of prior endangered species consultations conducted between the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. A description of the information comprising the BA and a listing of the associated documents is provided in the following letters.

All of the information comprising the BA will be made available for review by the federal decision-maker as part of the review of the information contained in the administrative record. Requests for copies of the documents that comprise the BA should be made to:

Lester Snow
Regional Director
Bureau of Reclamation
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825-1898
(916) 979-2066

Letter to the U.S. Fish and Wildlife Service

United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:
MP-150
ENV-7.00

JUN - 6 2000

MEMORANDUM

To: Field Supervisor, Sacramento Fish and Wildlife Office, U.S. Fish and Wildlife Service Sacramento, California

From: FOR Lester A. Snow
Regional Director

Subject: Trinity River Mainstem Fishery Restoration Program - Request for Formal Consultation

I am writing to request reinitiation of formal consultation under §7 of the Endangered Species Act, pursuant to 50 C.F.R. 402.16(b), for the potential adverse effects upon the threatened delta smelt (*Hypomesus transpacificus*) and its designated critical habitat, threatened bald eagle (*Haliaeetus leucocephalus*), endangered salt marsh harvest mouse (*Reithrodontomys raviventris*), and endangered California clapper rail (*Rallus longirostris obsoletus*) that may result from changes in operation of the Central Valley Project (CVP) due to implementation of the Preferred Alternative for the proposed Trinity River Mainstem Fishery Restoration Program ("Preferred Alternative"). Reinitiation of consultation is appropriate due to the potential for changed circumstances from those evaluated in the biological opinion titled *Formal Consultation and Conference on Effects of Long-term Operation of the Central Valley Project and State Water Project on the Threatened Delta Smelt, Delta Smelt Critical Habitat, and Proposed Threatened Sacramento Splittail*, dated March 6, 1995, at Attachment 1, and the biological opinion titled *Formal Endangered Species Act Consultation on Effects of Implementing Long Term Operational Criteria and Plan {"OCAP"} for Central Valley Project Reservoirs*, dated February 12, 1993, at Attachment 2. Additionally, we are supplementing our request for conversion of a conference opinion to a formal biological opinion over the potential for adverse effects to the threatened Sacramento splittail (*Pogonichthys macrolepidotus*), resulting from operation of the CVP, dated February 18, 1999.

We are also writing to initiate informal consultation on implementation of the Preferred Alternative upon the bald eagle and the threatened Northern spotted owl (*Strix occidentalis*) within the Trinity River watershed. Based on information described in the *Biological Assessment for Those Actions in the Preferred Alternative of the Proposed Trinity River Mainstem Fishery Restoration Program That May Affect Listed Species and Their Designated Critical Habitat in the Trinity and Klamath Rivers*, provided at Attachment 3, we believe that implementation of the proposed project may affect, but is not likely to adversely affect, either species within the geographic area described in that enclosure, nor is it likely to adversely modify designated critical habitat for the Northern spotted owl.

The Preferred Alternative consists of a combination of a change in the flow regime on the Trinity River, downstream of Lewiston Dam, combined with mechanized channel restoration projects within the

channel and floodway of the mainstem of the Trinity River, and with watershed restoration actions in the Trinity River watershed. A more detailed description of the Preferred Alternative is found under the heading "Flow Evaluation Alternative"[1], at Chapter 2 in the draft Environmental Impact Statement/Environmental Impact Report for the Trinity River Mainstem Fishery Restoration Program ("Trinity DEIS/EIR"), at Attachment 4. The purpose of the proposed action is to restore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam. Implementation of the Preferred Alternative may necessitate revised operations within other elements of the CVP, in order to minimize the potential for adverse effects to listed anadromous fish species and their designated critical habitat, within the central valley of California. A description of these potential actions are described Chapter 3 and Appendix A of the Trinity DEIS/EIR, and in the *Biological Assessment for Effects of the Central Valley Project and State Water Project Operations from October 1998 through March 2000 on Steelhead and Spring-run Chinook Salmon*, a copy of which is included at Attachment 5.

The specific areas where the listed species occur, that may be affected by the implementation of the Preferred Alternative, include the Trinity River below Lewiston Reservoir, the Sacramento River below Keswick Dam, two California Water Project Reservoirs (Lake Oroville and San Luis Reservoir), and the Feather River below Oroville Dam; Folsom Reservoir and the lower American River, below that reservoir; Millerton Reservoir and the San Joaquin River below that reservoir; and the Sacramento-San Joaquin River Delta ("Delta"). Additional detail on these areas are found in the Trinity DEIS/EIR at Chapter 3 and in the Central Valley Project Improvement Act (CVPIA) Programmatic Environmental Impact Statement (PEIS) at Chapter 3 and technical appendix Volume 3, provided at Attachment 6, and in Attachment 5 at Chapters 2, 3, 5, and 6.

By this letter, Reclamation is transmitting the following enclosed documents to the Sacramento Fish and Wildlife Office, which collectively serve as our biological assessment for this consultation: 1) *Formal Consultation and Conference on Effects of Long-term Operation of the Central Valley Project and State Water Project on the Threatened Delta Smelt, Delta Smelt Critical Habitat, and Proposed Threatened Sacramento Splittail*, dated March 6, 1995; 2) *Formal Endangered Species Act Consultation on Effects of Implementing Long Term Operational Criteria and Plan (OCAP) for Central Valley Project Reservoirs*, dated February 12, 1993; 3) *Biological Assessment for Those Actions in the Preferred Alternative of the Proposed Trinity River Mainstem Fishery Restoration Program That May Affect Listed Species and Their Designated Critical Habitat in the Trinity and Klamath Rivers*; 4) the Trinity DEIS/EIR; 5) *Biological Assessment for Effects of the Central Valley Project and State Water Project Operations from October 1998 through March 2000 on Steelhead and Spring-run Chinook Salmon*, 6) the CVPIA PEIS; 7) *Explanation of Tables and Figures Generated From Original Data Sets in PROSIM Modeling for Trinity River Mainstem Fishery Restoration Draft EIS/EIR ("Trinity DEIS/EIR")*; and 8) *Foraging Ecology of Bald Eagles on Shasta Lake (Draft), March 2000*[2]

As stated in Chapter 4 of the Trinity DEIS/EIR, water committed to increased instream flow in the Trinity River is no longer available for use in the Central Valley, which may affect listed species or their

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[1]The terms "Preferred Alternative" and "Flow Evaluation Alternative" are used interchangeably in this letter and in the biological assessment for the proposed action.

[2]Note that this report is in draft form and has not been peer reviewed. However, it represents a component of the best scientific information available concerning possible effects upon the bald eagle at this time.

designated critical habitat. Changes in Delta inflow and outflow may affect listed species resident in or passing through the Delta, or adversely affect designated critical habitat.

Chapter 3 of the Trinity DEIS/EIR describes potential impacts to native anadromous fish and resident native fish in the Central Valley. The attachments at Attachment 7 present further, more detailed, evaluation of output data generated by PROSIM for the development of the Trinity DEIS/EIR. PROSIM is a monthly planning model designed to simulate the response of the hydrologic systems of the CVP to changes in operating parameters. This comparative model is considered "state of the art" methodology for assessing impacts to the CVP and was the tool used in developing and analyzing the alternatives presented in the Trinity DEIS/EIR. Data shown in the attachments are organized to more specifically compare differences between 1) level of development in 1995 ("Existing Conditions") against development in the year 2020 ("No Action Alternative"), and 2) the No Action Alternative against the Preferred Alternative (which are both at year 2020 level of development)[3]. The Trinity DEIS/EIR compares these conditions; however, data used in the Trinity DEIS/EIR are shown as average annual changes rather than monthly averages by calendar year and water year type. Further evaluation of the raw data used to develop the Trinity DEIS/EIR, as presented in Attachment 7, more clearly illustrates whether there are specific hydrologic periods when effects upon listed species and critical habitat may occur, and at what time of the year such effects may occur. Additionally, the more precise output assists in identifying outlier data points that may bias the analysis presented in the Trinity DEIS/EIR. This analysis was conducted to more precisely identify potential effects upon listed species.

Comparing the hydrologic conditions modeled for the Preferred Alternative with the conditions modeled for the No Action Alternative allows evaluation of the effects of the proposed action against other future conditions. Subsequent comparison of this information, evaluated against a similar comparison of the modeling of the No Action Alternative against modeling of the Existing Conditions, allows differentiation between effects associated with the Preferred Alternative and effects from other future actions such as increased demands due to increased development.

Our conclusion is that implementation of the Preferred Alternative may result in adverse effects upon the threatened delta smelt and Sacramento splittail and may adversely affect designated critical habitat of the delta smelt, as well as having the potential to adversely affect habitat for other fish species that utilize the Delta. The allowable ratio of exports to inflow agreed upon in the Delta Accord and other requirements of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary were not exceeded for any year simulated; however, there were changes to Delta inflow and outflow. Table 3-16 of the Trinity DEIS/EIR is a summary which displays the percent of years under the Preferred Alternative where Delta outflows are at least 10 percent less than the baseline used for evaluating all alternatives. Conditions in the month of June showed the most change and comparisons of the model study results indicated the larger changes occurred primarily in wet and above normal years. Additional detail on these effects is presented in Attachment 7. These reductions in outflows may be substantial and may adversely affect designated critical habitat for delta smelt by changing the location and, therefore, the volume of the entrapment zone. The reductions may also increase the magnitude of transport effects

[3] Detailed descriptions of the Preferred Alternative, No Action Alternative, and Existing Conditions are found in the Trinity DEIS/EIR at Chapter 2.

that result from the operation of the export facilities upon flow directions in Delta waterways. This may result in adverse effects upon both delta smelt and Sacramento splittail due to the possibility of increased levels of take at the export facilities.

CVP operations in the Delta would continue to be managed to avoid or minimize changes to environmental conditions in the Delta likely to cause adverse impacts to both resident native species and species moving through the Delta. The simulated operations prepared for the CVPIA B2 Interagency Team could be used to evaluate potential changes to Delta conditions and actions available to meet requirements of the March 6, 1995, biological opinion.

The simulated Shasta Reservoir storage information provided within Attachment 7, shows a reduction in storage for all months in years that are classified as "Below Normal" or drier, based on hydrologic conditions. These reductions are substantial under some hydrologic circumstances. In "Above Normal" or wetter years, the reductions in volume are generally not as extensive in either duration or magnitude. The February 12, 1993, biological opinion for the CVP OCAP called for monitoring programs at Shasta Lake after noting that reproductive success of bald eagles appeared to be correlated with mean reservoir surface elevations during the breeding seasons. These programs were implemented and conducted in collaboration with the U.S. Forest Service, Attachment 8. Although detailed data concerning foraging activity were obtained, the relationship between lake levels and reproductive success is not clear due to complicating factors such as human use of the reservoirs and surrounding land. There was an absence of correlation between lake levels and breeding success at Trinity Reservoir. Several patterns and observations did result from the studies:

1) The number of nesting pairs has increased fairly steadily at Shasta Lake over the past thirty years, even during drought years.

2) Reproductive success per nest has shown year to year variations, but no definitive correlations were apparent that related lake elevations with breeding success. Bald eagle breeding success remains well within the range of success characteristic of stable bald eagle populations.

3) While the general apparent relationship of reproductive succession with lake elevation still holds, the data from the studies suggests that intraspecific competition may be equally or even more important. Reproductive success in the early 80's was about twice that of the equally wet late 90's when the number of nesting pairs had doubled. In addition, isolated low elevation years tend to have relatively high reproductive success, suggesting that factors other than lake elevations per se exhibit greater influence over reproductive success.

4) The bald eagles at Shasta Lake are part of a large, wide-ranging population that exploit available habitat as far north as the Great Slave Lake, thus confounding any attempt to develop reservoir-specific breeding success and masking any attempt to develop effects on the bald eagle population as a whole from any one specific location. In fact available information would indicate stable or increasing bald eagle populations.

It appears from the data available that year to year lake level variations have no clearly demonstrable effect and that from an overall perspective bald eagle populations are actually increasing at Lake Shasta.

Thus, given the magnitude of the changes in reservoir elevation that could occur in Shasta Lake from implementation of the Preferred Alternative, such implementation would not likely adversely affect bald eagles.

By a letter to the U.S. Environmental Protection Agency (USEPA), dated September 14, 1995, the USFWS stated that implementation of the State Water Resources Control Board's (SWRCB) Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("WQCP") will not likely adversely affect the previous conclusions of the USFWS's biological opinion on the USEPA's proposed Water Quality Standards for the San Francisco Bay/Sacramento-San Joaquin Rivers and Delta, reference number 1-1-93-F-61, dated November 2, 1994. The conclusion of that opinion was that implementation and adherence to the standards would not likely result in adverse affects upon either the salt marsh harvest mouse or the California clapper rail. The allowable ratio of exports to inflow and other requirements of the WQCP were not exceeded for any year simulated in the preparation of the Trinity DEIS/EIR. Since implementation of the Preferred Alternative is not expected to result in violations of the WQCP, we believe that the Preferred Alternative is not likely to adversely affect either the salt marsh harvest mouse or the California clapper rail.

We request that you provide us with a draft biological opinion, prior to delivery of a final biological opinion. We continue to remain available to your staff during this consultation process. Please direct questions regarding the information provided herein to Chet Bowling, Reclamation, at (916) 979-2066.

Lowell F Ploss

Attachments
1. Formal Consultation and Conference on Effects of Long-term Operation of the Central Valley Project and State Water Project on the Threatened Delta Smelt, Delta Smelt Critical Habitat, and Proposed Threatened Sacramento Splittail, dated March 6, 1995
2. Formal Endangered Species Act Consultation on Effects of Implementing Long Term Operational Criteria and Plan (OCAP) for Central Valley Project Reservoirs, dated February 12, 1993
3. Biological Assessment for Those Actions in the Preferred Alternative of the Proposed Trinity River Mainstem Fishery Restoration Program That May Affect Listed Species and Their Designated Critical Habitat in the Trinity and Klamath Rivers
4. Trinity River Mainstem Fishery Restoration Draft EIS/EIR
5. Biological Assessment for Effects of the Central Valley Project and State Water Project Operations from October 1998 through March 2000 on Steelhead and Spring-run Chinook Salmon
6. Central Valley Project Improvement Act PEIS
7. Explanation of Tables and Figures Generated From Original Data Sets in PROSIM Modeling for Trinity River Mainstem Fishery Restoration Draft EIS/EIR ("Trinity DEIS/EIR")
8. Foraging Ecology of Bald Eagles on Shasta Lake (Draft), March 2000

Letter to the National Marine Fisheries Service

United States Department of the Interior

June 6, 2000

U.S. Fish and Wildlife Service
California/Nevada Operations Office
2800 Cottage Way, Suite W-2606
Sacramento, California 95825

U.S. Bureau of Reclamation
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

Mr. Rodney R. McGinnis
Acting Regional Administrator
National Marine Fisheries Service
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

Dear Mr. McGinnis:

We are writing to supplement our request to the National Marine Fisheries Service (NMFS) to initiate formal consultation under Section 7 of the Endangered Species Act, dated December 14, 1999, over potential effects upon listed threatened or endangered species that may result from implementation of the Preferred Alternative of the proposed Trinity River Mainstem Fishery Restoration Program ("Preferred Alternative"). By that letter, the U.S. Bureau of Reclamation (USBR) and the U.S. Fish and Wildlife Service (USFWS) initiated formal consultation on the threatened coho salmon, threatened spring run chinook salmon, and the endangered winter run chinook salmon. We have enclosed supplemental information, under the title *Biological Assessment for Those Actions in the Preferred Alternative of the Proposed Trinity River Mainstem Fishery Restoration Program*, provided at Enclosure 1, concerning effects from the proposed project upon the coho salmon and its designated critical habitat, for use in the consultation. Additionally, we have determined that we must request reinitiation of the formal Section 7 consultation, conducted in 1992-1993, over the potential for impacts to the endangered winter run chinook salmon, and its designated critical habitat resulting from the long term implementation of the Operating Criteria and Plan (OCAP) for the Central Valley Project (CVP), due to changed circumstances from those evaluated in the *Biological Assessment and Biological Opinion for the OCAP for the CVP/SWP on the Winter Run Chinook Salmon*, provided at Enclosure 2, that would result from implementation of the Preferred Alternative.

Subsequent to the date that we initiated formal Section 7 consultation on this program, critical habitat was designated for spring run chinook salmon and steelhead trout. Actions taken within the scope of the program, as briefly described in our initial letter may result in effects upon such

critical habitat. By this letter, we are expanding our request to enter into formal Section 7 consultation to include an evaluation and consideration of potential effects upon the threatened steelhead trout and designated critical habitat for spring run chinook salmon and steelhead trout.

The Preferred Alternative consists of a combination of a change in the flow regime on the Trinity River, downstream of Lewiston Dam, combined with mechanized channel restoration projects within the channel and floodway of the mainstem of the Trinity River, and watershed restoration actions in the Trinity River watershed. A more detailed description of the Preferred Alternative is found under the heading "Flow Evaluation Alternative"[1], at Chapter 2 in the draft Environmental Impact Statement/Environmental Impact Report for the Trinity River Mainstem Fishery Restoration Program ("Trinity DEIS/EIR"), at Enclosure 3. The purpose of the proposed action is to restore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam. Implementation of the Preferred Alternative may necessitate revised operations within other elements of the CVP, in order to minimize the potential for adverse effects to listed anadromous fish species species and their designated critical habitat. A description of such potential revisions to existing CVP operation were initially provided to you in the *Biological Assessment for Effects of the Central Valley Project and State Water Project Operations from October 1998 through March 2000 on Steelhead and Spring-run Chinook Salmon*, with additional protective revisions described in the associated biological opinion, both provided at Enclosure 4.

The specific areas where listed salmonid species occur, that may be affected by the implementation of the Preferred Alternative, include the mainstem of the Trinity River from Lewiston Reservoir to its confluence with the Klamath River and thence downstream to its outlet to the Pacific Ocean; as well as those areas previously identified in our request for consultation on the CVP OCAP. Please note that these areas all constitute designated critical habitat for one or more of the listed anadromous fish species that we are consulting on, with the exception of tribal lands on the Trinity River and the Klamath River. Additional detail on these areas can be found in the Trinity DEIS/EIR at Chapter 3 and in the Central Valley Project Improvement Act (CVPIA) Programmatic Environmental Impact Statement (PEIS) at Chapter 3 and in technical appendix Volume 3, both provided at Enclosure 5, and in Enclosure 4 at Chapters 2, 3, 5, and 6.

By this letter, the USFWS and USBR are transmitting the following enclosed documents to the NMFS, which collectively serve as our biological assessment for this consultation: 1) the *Biological Assessment for Those Actions in the Preferred Alternative of the Proposed Trinity River Mainstem Fishery Restoration Program That May Affect Listed Species and Their Designated Critical Habitat in the Trinity and Klamath Rivers*; 2) the *1993 Biological Assessment and Biological Opinion for the OCAP for the CVP/SWP on the Winter Run Chinook Salmon*; 3) the DEIS/EIR for the Trinity River Mainstem Fishery Restoration Project; 4) the *Biological Assessment for Effects of Central Valley Project and State Water Project Operations from October 1998 through March 2000 on Steelhead and Spring-run Chinook Salmon*, with its associated biological opinion; 5) the Central Valley Project Improvement Act (CVPIA) PEIS;

[1] The terms "Preferred Alternative" and "Flow Evaluation Alternative" are used interchangeably in this letter and in the biological assessment for the proposed action.

and 6) *Explanation of Tables and Figures Generated From Original Data Sets in PROSIM Modeling for the Trinity River Mainstem Fishery Restoration Draft EIS/EIR (Trinity DEIS/EIR").*

As stated in Chapter 4 of the Trinity DEIS/EIR, water commited to increased instream flow in the Trinty River is no longer available for use in the Central Valley, which may affect listed species or their designated critical habitat because temperature objectives and carryover storage criteria established in the 1993 Sacramento winter run chinook salmon biological opinion may be violated, resulting in additional adverse effects not previously evaluated. Additional information on these effects is provided at Enclosure 6 and in Chapter 4 of the Trinity River DEIS/EIR. Associated changes in storage in Folsom Reservoir, reduced summer flow and increased water temperatures in the American River may affect steelhead and its designated critical habitat. Changes in Delta inflow and outflow may affect listed species resident in or passing through the Delta. These effects are discussed in Enclosure 5.

Chapter 3 of the Trinity DEIS/EIR describes potential impacts to native anadromous fish and resident native fish in the Central Valley. Chapter 2 of the CVPIA PEIS discusses temperature impacts in the American River in summer months in alternatives which include a different Trinity River release schedule than the Preferred Alternative and which include implementation of Section 3406(b)(2) of the CVPIA[2]. The Trinity DEIS/EIR concludes there would be adverse effects to Sacramento River fall and winter-run chinook salmon runs. These effects are primarily related to higher temperatures in the upper Sacramento River during the spawning and incubation periods of winter-run chinook salmon. A summary of percent change in temperature related losses of the early life stages of anadromous salmonids in the Sacramento River is provided in Table 3-15 of the Trinity DEIS/EIR. Estimated annual changes in temperature related mortality simulated for the period of 1922 through 1990 are presented in Appendix B of the Trinity DEIS/EIR, at Table B-27 and Attachment B14. A review of model study results in the attachments at Enclosure 6, discussed below, revealed that the majority of estimated losses for winter-run chinook salmon, compared to the No Action Alternative, resulted from extremely high mortalities during a small number of critically dry water years (1924, 1931 through 1934, 1937, and 1977). Under the existing OCAP biological opinion for winter run chinook salmon, there are no temperature criteria or carryover requirements for critically dry years. However, the USBR is currently required to reinitiate consultation with NMFS to develop an operations plan which attempts to minimize losses to winter-run chinook salmon under such circumstances.

The attachments at Enclosure 6 present further, more detailed evaluation of output data generated by PROSIM for the development of the Trinity River DEIS/EIR. PROSIM is a monthly planning model designed to simulate the response of the hydrologic systems of the Central Valley Project to changes in operating paramenters. This comparative model is considered "state of the art" methodology for assessing impacts to the CVP and was the tool used in developing and

[2] The Trinity River release schedule used in the CVPIA PEIS evaluated flows in the Trinity River ranging from 390,000 to 750,000 acre-feet per year, based on hydrologic year classification, and with no change in the minimum carryover storage for Trinity Reservoir. The diversions from the Trinity River into the Central Valley are reduced more under the Preferred Alterantive as a result of the 369,000 to 815,000 acre-foot per year flow schedule, combined with the increased 600,000 acre-foot minimum carryover storage. The temperature impacts of the CVPIA alternatives in the American River and lower Sacramento River resulting from reduced Trinity diversions to the Central Valley would be expected to be less in magnitude and frequency than those of the Preferred Alternative.

analyzing the alternatives presented in the Trinity DEIS/EIR. Data shown in the attachments are organized to more specifically compare differences between 1) level of development in 1995 ("Existing Conditions") against development in the year 2020 (the "No Action Alternative") and 2) the No Action Alternative against the Preferred Alternative (which are both shown at the year 2020 level of development)[3]. The Trinity DEIS/EIR compares these conditions; however, data used in the document are shown as average annual changes rather than monthly averages by calendar year and water year type. Further evaluation of the raw data used to develop the Trinity DEIS/EIR more clearly illustrates whether there are specific hydrologic periods when effects to listed species and critical habitat may occur, and at what time of the year such effects may occur. Additionally, the more precise output assists in identifying outlier data points that may bias the analysis as presented in the Trinity DEIS/EIR. This analysis was conducted to more precisely identify potential effects upon listed species.

Comparing the hydrologic conditions modeled for the Preferred Alternative with the conditions modeled for the No Action Alternative allows evaluation of the effects of the proposed action against other future conditions. Subsequent comparison of this information, evaluated against a similar comparison of the modeling of the No Action Alternative against modeling of the Existing Conditions, allows differentiation between effects associated with the Preferred Alternative and effects from other future actions such as increased demands due to increased development.

Our conclusion is that implementation of the Preferred Alternative may result in adverse effects upon listed salmonid species in the Sacramento River Basin. An evaluation of the data presented at Enclosure 6 shows that there are reductions in carry over storage at the end of the water year in Shasta, particularly in "Below Normal" or drier years, by the Preferred Alternative over the No Action Alternative. The modeled reduction shows that the requirements of the 1993 biological opinion for winter-run chinook salmon for carry over storage would not have been met in eight years, all which were classified as "Below Normal" or drier. The data in Enclosure 6 also show that there would be an increase in the number of incidences where the temperature requirements at Jelly's Ferry and Bend Bridge, under the same biological opinion, would not be met by the Preferred Alternative when they would otherwise be met under the No Action Alternative. However, the magnitude of the violations is generally minor. Last, there are reductions in outflows which may be substantial and may adversely affect designated critical habitat for winter and spring run chinook salmon and steelhead, and may also have the potential to adversely affect habitat for other fish species that utilize the Delta. These reductions may result in adverse transport effects on out migrating smolts, as well as adversely affecting designated critical habitat for listed salmonid species by changing the location and, therefore, the volume and characteristics of the entrapment zone.

To address potential temperature related impacts to winter-run chinook salmon and other Sacramento River salmonids, USBR will continue to incorporate reasoned biological decisions for managing limited cold water resources in Shasta Reservoir taking into account the actual

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[3] Detailed descriptions of the Preferred Alternative, No Action Alternative, and Existing Conditions are found in the Trinity DEIS/EIR at Chapter 2.

circumstances each year through the Sacramento River Temperature Task Group. Information presented at both Chapter 3 and Appendix A of the Trinity DEIS/EIR identifies several mitigation measures to improve the operation of Trinity and Shasta Reservoirs to meet temperature objectives in both the Trinity and Sacramento Rivers. Development of annual temperature control plans will be initiated as early as October 1 each year in coordination with the implementation of Section 3406(b)(2) of the CVPIA. Through the CVPIA B2 Interagency Team, USBR, NMFS, and the USFWS may use existing discretion in scheduling Anadromous Fisheries Restoration Program instream flows to assist in cold water pool management and temperature control in the upper Sacramento River. The Sacramento River Temperature Task Group ("Task Group") has a history of effectively managing the available cold water resources for temperature control priorities. USBR has worked each year with the Task Group to avoid or minimize potential temperature impacts on the endangered winter-run chinook and other listed salmonid species in the Sacramento River. The Task Group would continue to evaluate alternative operational plans with the changes that would result from the new direction of resources under implementation of the Preferred Alternative. USBR will continue to evaluate the performance of the Shasta Dam temperature control device and manage operations accordingly. The American River Operations Group performs a similar function in assisting USBR to manage flow and cold water resources for temperature control priorities in the Lower American River. USBR will continue to work with the American River Operations Group to address potential impacts of implementing the proposed Preferred Alternative on listed salmonid species.

When evaluating potential measures to address outflow and transport effects, we must first note that the allowable ratio of exports to inflow agreed upon in the Bay-Delta Accord and other requirements of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary were not exceeded for any year simulated; however, there were changes to Delta inflow and outflow. Table 3-16 of the Trinity DEIS/EIR is a summary displaying the percentage of years in which Delta outflows are at least 10 percent less than the baseline used for evaluating all alternatives. As shown it that table, conditions in the month of June showed the greatest amount of change and comparisons of the model study results at Enclosure 6 indicated the larger changes occured primarily in wet and above normal years. CVP operations in the Delta would be managed to avoid or minimize changes to environmental conditions in the Delta likely to cause adverse impacts to both resident native species and species moving through the Delta. The simulated operations prepared for the CVPIA B2 Interagency Team could be used to evaluate potential changes to Delta conditions and actions available to meet water quality and listed species protection requirements.

We request that you provide us with a draft biological opinion, prior to delivery of a final biological opinion. We continue to remain available to your staff during this consultation process. Please direct questions regarding the information provided herein to Chet Bowling, USBR, at (916)979-2066, or Mary Ellen Mueller, USFWS, at (916) 414-6464.

Sincerely,

Michael J. Spear
Manager
California/Nevada Operations Office
U.S. Fish and Wildlife Service

Lester A. Snow
Regional Director
Mid-Pacific Region
U.S. Bureau of Reclamation

cc:

Don Reck, NMFS
Gary Stern, NMFS
Jim Lecky, NMFS

Enclosures:

1. Biological Assessment for Those Actions in the Preferred Alternative of the Proposed Trinity River Mainstem Fishery Restoration Program That May Affect Listed Species and Their Designated Critical Habitat in the Trinity and Klamath Rivers
2. 1993 Biological Assessment and Biological Opinion for the OCAP for the CVP/SWP on the Winter Run Chinook Salmon
3. Trinity River Mainstem Fishery Restoration DEIS/EIR
4. Biological Assessment for Effects of Central Valley Project and State Water Project Operations from October 1998 through March 2000 on Steelhead and Spring-run Chinook Salmon
5. Central Valley Project Improvement Act (CVPIA) PEIS
6. Explanation of Tables and Figures Generated From Original Data Sets in PROSIM Modeling for the Trinity River Mainstem Fishery Restoration Draft EIS/EIR (Trinity DEIS/EIR").

Appendix C
Implementation Plan and AEAM Plan

APPENDIX C

Implementation Plan for the Preferred Alternative of the Trinity River EIS/EIR

The proposed action consists of 6 components: 1) an increased flow regime and associated OCAP for managing releases and reservoir levels; 2) a channel rehabilitation program (mechanical rehabilitation); 3) a coarse and fine sediment management program; 4) infrastructure modifications; 5) upslope watershed restoration; and 6) an Adaptive Environmental Assessment and Management organization.

1. Increased Flow Regime and Trinity River Operating Criteria and Procedures

1.1 Legal Principles Concerning TRD Operations

In section 3406(b)(23) of the Central Valley Project Improvement Act (CVPIA) (Public Law 102-575, 106 Stat. 4600, 4720), Congress called for the development of operating criteria and procedures (OCAP) for the Trinity River Division (TRD), along with recommendations for necessary instream fishery flow requirements, for the restoration and maintenance of the Trinity River fishery. Accordingly, this document describes the legal principles and scientific recommendations that apply to TRD operations and establishes OCAP required for the proper operation of the TRD consistent with those principles and recommendations.

This section briefly describes the legal principles that apply to the operations of the TRD. A detailed description can also be found in the FEIS/ EIR, chapter 1.

In 1955, Congress authorized the construction and operation of the TRD (Public Law 84-386). Although Congress authorized the TRD as an integrated feature of the Central Valley Project, the authorizing legislation also directed the Secretary of the Interior to ensure the preservation and propagation of the Trinity River's fish and wildlife resources. A 1979 Solicitor's Opinion stated that the 1955 Act thus required sufficient in-basin flows determined by the Secretary as necessary for fish and wildlife to take precedence over exports of Trinity River flows to the Central Valley. *Proposed Contract with Grasslands Water District* (Dec. 7, 1979). Following construction and operation of the TRD in the early 1960s, substantial fish populations declines occurred. A 1980 EIS concluded that insufficient stream flows in the Trinity River represented the most critical limiting factor. Therefore, Secretary Andrus initiated the Trinity River flow study in 1981 to determine necessary instream flows in the Trinity River and other measures necessary to restore and maintain the Trinity River fishery consistent with the statutory directives of the 1955 Act and the federal government's trust responsibility to the Hoopa Valley and Yurok Tribes.

Congress reiterated the importance of the Trinity River fishery in subsequent legislation. In 1984, Congress passed the Trinity River Basin Fish and Wildlife Management Act (Public Law 98-541) that established a goal to restore the basin's fish and wildlife populations to

those that existed prior to construction of the TRD and directed the Secretary to implement measures to restore fish and wildlife habitat in the Trinity River. In re-authorizing this legislation in 1996 (Public Law 104-143), Congress further elaborated on the restoration goal, stating that restoration would be measured "not only by returning adult anadromous fish spawners," but also by the ability of dependent tribal, commercial, sport fishers to enjoy the benefits of restoration through a harvestable fishery resource.

With regard to tribal fishing rights, the Solicitor issued an opinion entitled "Fishing Rights of the Yurok and Hoopa Valley Tribes," M-36975 (Oct. 4, 1993). The Opinion recognized the historic dependence of the area's Indians upon the fishery resources of the Klamath River Basin (including the Trinity River) for subsistence, ceremonial, and economic purposes; determined that the Yurok and Hoopa Valley Tribes have federally reserved fishing rights as a result of this dependence and the subsequent establishment of their reservations; and concluded that the Tribes were entitled to an allocation of the Klamath Basin fishery harvest sufficient to support a moderate standard of living, but no more than 50 percent of the annual harvest allocation. However, during times of shortages tribal fisheries may take priority over other fisheries (Solicitors Opinion, footnote 39). The Opinion also stated that protection of these rights could affect off-reservation activities. Under the Magnuson Fishery Conservation and Management Act (16 U.S.C. § 1801 *et seq.*), the Department of Commerce adopted the Solicitor's determinations in an interpretative rule that restricted ocean harvest. 58 Fed. Reg. 68063 (Dec. 23, 1993). The Solicitor's Opinion and the subsequent rule were upheld by the United States Court of Appeals for the Ninth Circuit in *Parravano v. Babbitt*, 70 F.3d 539 (9th Cir. 1995).

Perhaps most significantly, Congress passed the CVPIA in 1992 that further addressed, *inter alia*, the need to restore the Trinity River and its resources. In section 3406(b)(23), Congress directed the completion of the flow study initiated by Secretary Andrus "in a manner that insures the development of recommendations, based on the best available scientific data, regarding permanent instream fishery flow requirements and [TRD OCAP] for the restoration and maintenance of the Trinity River fishery." Congress also provided for interim minimum flows to be continued in the Trinity River, consistent with a prior administrative decision by Secretary Lujan, pending completion of the flow study. The section further provided that, if the Secretary and the Hoopa Valley Tribe concur in these recommendations, then any increased instream fishery flows and the OCAP "shall be implemented accordingly." Thus, in meeting the statutory requirements of developing instream fishery flow requirements and TRD OCAP, Congress incorporated the previously recognized goals and rationale for the restoration of the Trinity River fishery, stating that the purposes of these efforts were "to meet the Federal trust responsibilities to protect the fishery resources" and "to meet the fishery restoration goals" of the 1984 Act.

It should also be noted that operations of the TRD must also be consistent with other applicable laws. For example, pursuant to the Endangered Species Act (16 U.S.C. § 1531 *et seq.*), TRD operations must avoid jeopardizing threatened coho salmon and associated critical habitat, as well as affirmatively taking actions to conserve listed species. Under the Clean Water Act, the Trinity River has been listed as an impaired water body by the State of California, and the State's Water Quality Control Plan for the North Coast Region states that "flow depletion" by TRD diversions to the Central Valley are a major cause of the river's impaired status in terms of sediment. The State of California's Water Resources Control

Board has also addressed the needs of the Trinity River, *e.g.*, a 1990 water permit condition specifically states that TRD operations shall not "adversely affect salmonid spawning and egg incubation in the Trinity River."

These OCAP have been formulated according to the legal principles outlined above. These OCAP are designed to implement the recommendations provided in the Preferred Alternative in the FEIS/EIR in order to restore and maintain the fishery resources of the Trinity River. By determining the fishery flow requirements for the Trinity River pursuant to applicable law, including the CVPIA, the flow requirements and annual hydrology implicitly determine the surplus water available for diversion to the Central Valley. These OCAP amend and supplement those relating to the TRD in the 1992 Long-term Central Valley Project Operations Criteria and Plan (CVP-OCAP). To the extent inconsistent with the CVP-OCAP, these OCAP control.

1.2 Purpose and Use of This Document

This document provides supplemental information and guidance to support the implementation of the Record Of Decision (ROD) of the Preferred Alternative of the Trinity River Final EIS/EIR (May 2000). The Preferred Alternative increases dam releases to the Trinity River to restore the anadromous fishery resources. This document supplements and supersedes information on the Trinity River sections of the Long-term Central Valley Project Operations Criteria and Plan (LCVP-OCAP) (USBR 1992). For more detailed information regarding operations of the entire Trinity River Division of the Central Valley Project, refer to the CVP-OCAP (USBR 1992).

1.3 Instream Release Volumes to the Trinity River

Under the preferred alternative, releases to the Trinity River for salmon and steelhead restoration will vary with annual basin water runoff for the watershed upstream of Lewiston Dam (Table 1). Historical hydrology was used to delineate five water-year (WY) classes. A water year begins on October 1 and ends on September 30. Pre-dam flow records (WY1912 to 1960) from the USGS gaging station at Lewiston and post dam estimates (WY 1961 to WY 1995) of inflow into Trinity Lake were combined, ranked, and exceedence probabilities calculated. Annual instream fishery flows are based upon five water-year classes that were identified in the Trinity River Flow Evaluation Report (USFWS and Hoopa Valley Tribe, 1999).

TABLE 1
Annual (April through March) instream fishery flows for Trinity River.

Water-Year Class	Trinity River Allocation (TAF)	Annual Basin Water Runoff (TAF)[a]	Probability of Occurrence
Extremely Wet	815.2	2,000	0.12
Wet	701.0	1,350 to 2,000	0.28
Normal	646.9	1,025 to 1,350	0.20
Dry	452.6	650 to 1,025	0.28
Critically Dry	368.6	<650	0.12

[a]Based on the basin area above Lewiston Dam.

1.4 Operations Forecasting

Forecasting of hydrological conditions is an ongoing procedure that Reclamation uses to project water supply availability. This process is integral to the operations planning process whereby the current year is classified, river flow schedules are developed, and other beneficial uses of the water supply are determined.

Beginning in February, Reclamation begins forecasting the upcoming year hydrologic conditions and potential operations. Forecasts provide estimates of monthly information on water allocations, reservoir storage, instream releases, electrical generation and capacity. Forecasts are based upon precipitation and runoff conditions and snow course measurements. The runoff forecast in February is considered the first reliable forecast because more than one half of the precipitation year has occurred and snowpack measurements regularly occur. Runoff forecasts are updated in March, April, and May and are used in operational planning for the rest of the water year. Forecasts that occur later in the year are more reliable due to decreased variability of precipitation patterns. Forecasts are generally produced with 50 and 90 percent exceedence probabilities, but the 90 percent exceedence forecast is generally used for planning purposes and is required for CVP operational forecasts as a result of the 1993 Biological Opinion on Sacramento River winter run Chinook (NMFS, 1993).

1.5 Water Year Designation

Normally the water year type can be reliably determined by April 1, when maximum snow pack has occurred. To determine the water year type, annual basin runoff above the Lewiston gage is determined. Annual basin runoff is calculated by summing the amount of runoff that has occurred from October until April 1 and a volume of water that Reclamation forecasters predict (90 percent probability of exceedence) will runoff during the months remaining in the water year (i.e., April through September) using the April 1 runoff forecast projection from the California cooperative snow surveys, California Department of Water Resources, Bulletin 120. Total water runoff is then compared to the ranges in Table 1 to designate the water year class.

1.6 Dam Releases to the Trinity River

Beginning in early February, Reclamation will provide the Trinity Management Council (see the section Organizing to Implement the Trinity River Restoration Program) with a preliminary estimate of the water year classification. The Trinity Management Council (TMC) will formulate a preliminary instream fishery release schedule to the Trinity River and submit it to Reclamation for operational planning. Final decisions on the designation of the water year will be based on the April 1 runoff forecast. By April 15 of each year, Reclamation will request from the TMC, a final Lewiston Dam instream fishery release schedule. Reclamation will operate the TRD as closely to the proposed schedule as technically possible.

Initially, Lewiston Dam spring releases of 8,500 and 11,000 ft^3/s that are recommended for Wet and Extremely Wet water years, respectively, will not be released into the Trinity River due to the need to modify 4 bridges and address other existing improvements in the floodplain that may be affected by releases in excess of 6,000 ft^3/s. Peak spring releases for Wet and Extremely Wet water years will be held to 6,000 ft^3/s until sufficient construction

activities have occurred to allow for the safe release of higher spring flows. It is currently anticipated that these construction activities will preclude releasing higher (>6,000 ft^3/s) spring flows until water year 2003 (See Footnote in Attachment 1).

Attachment 1 provides an average daily flow rate in cubic feet per second for Lewiston Dam releases to the Trinity River. Though the annual Trinity River fishery volumes will follow those identified in Table 1 according to water year type, the daily releases may be changed in magnitude and/or duration at a future date to achieve fishery resource restoration goals in the Trinity River. Potential changes will be identified and referred to Reclamation for action by the TMC, the decision-making group of the Adaptive Environmental Assessment and Management (AEAM) organization and consistent with all applicable laws.

In October 1991, the State Water Resources Control Board established temperature objectives for the Trinity River, that were approved by U.S. Environmental Protection Agency as Clean Water Act standards in March, 1992 (Table 2). To assure the objectives are met, flows of at least 450 ft^3/s are scheduled during the summer until October 15th, after which ambient conditions are typically cold enough to warrant reducing flows to 300 ft^3/s.

TABLE 2
Temperature Objectives for the Trinity River.

Time Period	Daily Average °F (not to exceed)	River Reach
July 1 to September 14	60	Lewiston to Douglas City
September 15 to October 1	56	Lewiston to Douglas City
October 1 to December 31	56	Lewiston to the Confluence with the North Fork Trinity River

1.7 Ramping Rates

The rate at which dam releases increase or decrease are an important fishery concern as is the ability to respond to rare hydrologic events that can risk dam safety. Acceptable rates of change can vary with time of the year or day, species, water temperature, fish distribution and channel morphology. Rates of decreasing flow are particularly important to reduce stranding of salmon and steelhead fry. The criteria in Table 3 have been suggested by the USFWS (Memorandum from the USFWS to USBR, February 5, 1997) and have been used by Reclamation since 1997. These criteria supersede those provided in the LCVP-OCAP (USBR 1992). Scientific justification for these rates is provided in Attachment 2.

TABLE 3
Criteria for releases to the Trinity River from Lewiston Dam.

Lewiston Dam Release (ft^3/s)	When Increasing Flow[a]	When Decreasing Flow[b]
At or above 6,000	1,000 ft^3/s per 2 hours	500 ft^3/s per 4 hours
6,000 to 4,000	1,000 per 2 hours	400 per 4 hours
2,000 to 4,000	500 per 2 hours	200 per 4 hours
500 to 2,000	250 per 2 hours	100 per 4 hours
300 to 500	100 per 2 hours	50 per 4 hours

[a]Criteria are based upon the 1992 LCVP-OCAP (USBR 1992), and dam releases can increase anytime during the day.

[b]Criteria are based upon a recommendation from USFWS for November 1 thru April 15, and dam decreases to flow are recommended only during the night. After April 15, decreases can occur anytime during the day.

Activities of the Preferred Alternative, such as increased river flow and mechanical manipulations, will alter the existing stream channel. As such, the ramping rates provided in Table 3 may be refined at a future date. The TMC, through the AEAM organization, will evaluate ramping rates identified in Table 3 to meet fishery resource restoration objectives.

1.8 Trinity Lake Storage and Safety-of-Dam Releases

Lake storage targets established for the period between November 1 and March 31 identified in the LCVP-OCAP (USBR 1992) are established to attempt to maximize storage and beneficial uses of stored water (for hydropower production and irrigation and M&I water supplies in the Central Valley), as well as to minimize the risk of catastrophic dam overtopping. Storage in Trinity Lake is regulated within the powerplant capacity to storages shown in Table 4. When storage targets are exceeded, Reclamation releases excess water from Trinity Dam, that is then discharged to the Trinity River or to the Sacramento River through the Clear Creek Tunnel. Such releases are termed Safety-of-Dam (SOD) releases. When such releases occur, the quantity of water used will not be considered part of the fishery's year class annual allocations.

1.9 Cold Water Storage

Availability of cold water throughout the spring, summer, and fall are important criteria that affect downstream fishery resources. To assure water temperatures are suitable for salmonids in the Trinity River, Reclamation operates Trinity Lake and Lewiston Reservoirs to provide suitably cold water for release to the Trinity River, as well as cold water resources for salmonids in the Sacramento Basin. Reservoir storage is maintained at levels that typically do not compromise the availability of cold water to meet Trinity River Basin temperature objectives. Trinity Lake storage of 1,000,000 acre-feet through the end of October typically provides adequate quantities of cold water while allowing for power generation at Trinity Dam. However, when storage is below roughly 750,000 acre-feet during the July- September period or below 1,000,000 af in October, Reclamation may have to use the lower most outlet, the auxiliary outlet, to discharge cold water, that forgoes power generation. During extremely dry conditions (e.g. multiple year drought), carryover storage as low as 400,000 acre-feet results in extensive use of the auxiliary bypasses to achieve suitably cold water.

TABLE 4
Target Storage of Trinity Lake.

Date	Storage (acre-feet)	Lake Surface Elevation (ft)
Nov 1 to Dec 31	1,850,000	2327
Jan 31	1,900,000	2334
Feb 28,29	2,000,000	2341
Mar 31	2,100,000	2348

1.10 Relationship to the Adaptive Environmental Assessment and Management Organization

An integral part of the new flow regimes for the Trinity River is the implementation of the AEAM organization. AEAM is an important process for management of complex physical

and biological systems such as the Trinity River. The AEAM organization uses a designated team of scientists that recommend changes to fishery restoration efforts and annual operating schedules in response to monitored effects of implemented actions and in order to ensure that restoration goals of the Trinity River are effectively met. Annual recommendations are approved by the TMC. Alterations in magnitude and/or duration of releases into the Trinity River (while maintaining annual instream release volumes for each water year type) are dependent on the information/management needs of the Trinity River program. Any substantial deviation from the currently recommended fishery flow regime would be done in accordance with all applicable laws. For more specific information concerning the AEAM organization, refer to the AEAM section of the Trinity River Final EIS/EIR.

2. Mechanical Rehabilitation

2.1 Mainstem Mechanical Rehabilitation Program

Mechanical rehabilitation activities including the construction of channel rehabilitation and side channel projects will occur along the mainstem Trinity River from Lewiston Dam to the North Fork Trinity River confluence. Mechanical rehabilitation sites will increase the amount of shallow, low velocity areas for salmonid fry rearing, increase habitat complexity, provide stable habitat for salmonid fry and juveniles over a wide range of flows, and allow the river dynamics necessary to maintain an alluvial system. The intent of channel rehabilitation is to selectively remove the fossilized riparian berm (berms that have been anchored by extensive woody vegetation root systems and consolidated sand deposits), provide restoration of the natural riparian vegetation and age structure, and recreate alternate point bars similar in form to those that existed prior to the construction of the TRD.

Channel rehabilitation is not intended to completely remove all riparian vegetation, but to remove vegetation at strategic locations to promote alluvial processes necessary for the restoration and maintenance of salmonid populations. Channel rehabilitation projects will also allow fluvial processes to affect areas that do not receive mechanical treatments. The tightly bound berm material is hard to mobilize even at high flows, thus requiring some mechanical berm removal. After selected berm removal, subsequent high-flow releases and coarse sediment augmentation will maintain these alternate point bars and create a new dynamic channel.

Specific channel rehabilitation recommendations vary by river segment between Lewiston Dam and the North Fork Trinity confluence because the needs of channel rehabilitation change with tributary inputs of flow and sediment. A total of 44 potential channel-rehabilitation sites and 3 potential side channel-rehabilitation sites have been identified in the proposed action. These potential sites are located where channel morphology, sediment supply, and high-flow hydraulics would encourage a dynamic, alluvial channel. Appropriate agreements with landowners must be obtained before any access or construction on private lands. Other factors such as property ownership, access to sites, cost and available funding will then be considered in the prioritization process.

Before any actual physical work can begin on these sites, additional environmental documents, building upon, and “tiering” from, the Final EIS/EIR, will first have to be prepared. Furthermore, additional federal approvals (NEPA, ESA, 404, etc), along with

approvals from Trinity County and the California Department of Fish and Game in some instances, will be necessary. A short implementation period for a significant number of these projects is recommended to quickly increase the quality and quantity of salmonid habitat. The remaining projects may then proceed following an evaluation of the interaction of the channel rehabilitation sites with the new flow regimes.

2.2 High Flow and Channel Rehabilitation Implementation

Although flows up to 11,000 ft^3/s will not likely occur before the completion of bridge and structure modifications, the construction of mechanical rehabilitation projects should begin as soon as possible. This will assure that some modifications will be in place that will allow the river to create additional habitat once high flows can be implemented. It is important to emphasize that projects should be constructed with the understanding that the higher flows as recommended for fishery restoration objectives will occur when floodplain structures have been modified to accept higher flows. Without increased flows, channel and habitat diversity will not be greatly improved at mechanical rehabilitation sites. High flows will help establish proper riparian function by maintaining a higher water table at critical times, sort and distribute coarse and fine sediment adding to substrate complexity, and provide nutrient dispersal across floodplains and within the channel by movement and deposition of wood and riparian debris. River flow is an integral component to restoring aquatic and floodplain habitats. High river flow will continue to be the primary reason for improvements to habitat at mechanical rehabilitation sites and the river as a whole.

2.3 Location and Implementation Plan

Twenty-four sites are proposed during the first three years of construction if adequate funding is available. Additional projects will be constructed after evaluation of the first series of projects under Adaptive Environmental Assessment and Management. This evaluation will be ongoing beginning with construction of the first projects, but an interim period without construction activities may be necessary to fully evaluate the effectiveness of project designs and the effect of the new flow regime before beginning construction on the remaining sites.

Locations of project sites will generally occur in areas of historic point bars, channel meander areas, and high flow channels. These sites were determined to be the most suitable areas when analyzed by aerial photos and during reconnaissance surveys in 1995. An additional field survey was conducted in late 1999 to determine if the original 47 proposed sites were still the most appropriate areas for projects. Most of the previously identified sites are still in need of mechanical rehabilitation; however, the morphology at some sites has changed and some sites appear to be more appropriate for more immediate construction than others.

To determine prioritization for construction, the Mainstem Restoration Subcommittee of the Trinity River Task Force has begun the development of biologic and geomorphic prioritization criteria. Potential benefits and the certainty of benefits for each project are evaluated based on several criteria. Each potential site will be evaluated by this process and given a score based on biological and geormorphic considerations. Appropriate agreements with landowners must be obtained before any access or construction on private lands. Other

factors such as property ownership, access to sites, cost and available funding will then be considered in the prioritization process.

Construction of past pilot projects was limited by permit requirements to summer months to reduce fishery impacts. The primary construction season for future projects will likely be similarly constrained. However, construction during other seasons should not be precluded. Construction of the majority of any individual project could occur during other seasons with limited environmental impacts. Removal of riparian vegetation during other seasons could occur and the site could be built to grade without impacting in channel habitat. Tributary accretion that increases mainstem flows may create turbidity from sand and fine sediment, but this would occur regardless of the time of year a project is constructed. If a project is built during summer months, the fine sediment that remains on a point bar will still be moved into the channel by the first high flows following construction. Winter construction may actually be advantageous in some situations because later season floods that occur in January or February for example, may transport sediment out of the system more effectively than earlier freshets that occur in October or November. There may also be additional advantages to construction during other seasons such as eliminating impacts to nesting songbirds, increased assimilative capacity for construction-generated turbidity, and decreased construction costs.

3. Coarse and Fine Sediment Management Program

3.1 Coarse Sediment Augmentation Program

A coarse sediment management program is needed to replenish substrate essential in creating abundant fish habitat and attaining a functional dynamic alluvial river system (McBain & Trush, 1997). Blocked by the dams of the TRD, coarse sediment supplies from Lewiston Dam to the confluence with Rush Creek have been reduced mainly to those quantities artificially supplied through a spawning gravel augmentation program. As a consequence the amount of gravel stored immediately downstream of Lewiston Dam is decreasing. The previous augmentation program that existed was not sufficient to achieve a necessary balance of coarse sediment supply. Increasing river flows to magnitudes greater than those that have occurred in the past will increase gravel transport capability and therefore will require an augmentation program.

3.1.1 Immediate Coarse Sediment Needs

Two sites require immediate coarse sediment augmentation for spawning purposes. A 1,500-foot reach immediately downstream of Lewiston Dam (River Mile (RM) 111.9) needs roughly 10,000 yd^3 of course material (5/ 16 to 5 inch). A 750 foot reach immediately upstream of the USGS cableway at Lewiston (RM 110.2) requires roughly 6,000 yd^3 of course material (5/ 16 to 5 inch).

Coarse sediment sources are available in the immediate area and will be used for initial augmentation. Sources include dredge tailing downstream from Lewiston at RM 108.5, RM 106.3, and other locations. Dredge tailings are to be screened and substrate ranging from 5/ 16 inch to 5 inches will be placed at designated sites. Subsequent environmental review and permitting might be necessary to develop new sources of coarse sediment unless local

private mining operations in full compliance with environmental permitting requirements can meet the anticipated demand.

3.1.2 Future Coarse Sediment Augmentation

Increasing river flow through implementation of the Preferred Alternative will result in increased transport of coarse sediment through the river. Increased transport of coarse sediment from the upper river will require coarse sediment augmentation in most years. As part of the AEAM process, empirical data and model results will be used each year to identify the level of augmentation needed to balance the coarse sediment supply for the area between Lewiston Dam and Rush Creek. Estimates of the quantities needed for each year type are provided in **Error! Reference source not found.**. Coarse sediment placement will include use of heavy machinery to place gravels at desired sites during low flow conditions and also introductions during peak spring flows. The latter method entails placing the coarse sediment into the river at RM 110.9 where water velocity and hydraulic energy is sufficiently high allowing for fluvial dispersion.

Sources for the augmentation program include those sites that are to be used for immediate needs as well as other mine tailings located upstream and downstream of Lewiston. Coarse sediment at dredge tailings will be screened to eliminate fine sediment while providing spawning gravel that ranges from 5/ 16 inch to 5 inches.

TABLE 5
Estimates of Annual Coarse Sediment Augmentation.

Water Year Class	Cubic Yards per Year[a]
Extremely Wet	49,100
Wet	14,200
Normal	2,000
Dry	200
Critically Dry	0

[a]Actual volumes could vary by +/- 50 percent or greater. The AEAM process will monitor and test these hypotheses and recommend augmentation volumes on an annual basis based upon the results of previous years augmentation and modeling.

3.2 Fine Sediment Control: Dredging of Grass Valley Creek Sediment Collection Pools (Hamilton Ponds)

Hamilton Ponds in Grass Valley Creek periodically fill with decomposed granitic material due to historic logging practices and the highly erosive nature of the soils in the watershed. Without the periodic dredging, sediment would enter into the Trinity River and negatively impact salmonid spawning and rearing habitat. The dredging project is a continuation of from years past and involves periodically dredging roughly 42,000 yds^3 of mostly sand, and some gravel and cobble, from the three sediment collection basins (ponds) located just upstream from the confluence with the Trinity River. Dredging occurs when the ponds become full, that does not occur annually. Material will be dredged using an excavator. Loaded ten-yard dump trucks will haul the material to a designated spoils area located on site or offsite outside the creek's flood plain (see Negative Declaration and Initial Study, Trinity River Pool and riffle Construction for Fishery Restoration, April, 1985, State clearinghouse #84022805). The spoils area will be prepared by stripping and stockpiling

topsoil for use on the top of the newly deposited spoils. This will occur for revegetative purposes. Dredging will typically be conducted between July 1 and October 15 of the year in which the ponds fill. The ponds often fill during a single storm and runoff, especially in wet and extremely wet water years, losing trap efficiency. Dredging should occur whenever the ponds fill, preserving trap efficiency. Winter dredging should be investigated because this would prevent the ponds from filling and subsequently discharging sediment into the Trinity River during the winter and spring.

4. Infrastructure Modifications—Locations/Sites and Implementation Plan

Increasing releases from 6,000 to 11,000 ft^3/s for Trinity River restoration purposes may impact four bridges and will inundate private properties downstream to a minimal extent in most cases to almost total inundation for a limited number of parcels. From Lewiston Dam to the confluence with Rush Creek (~5 miles), releases of 11,000 ft^3/s exceed the current 100-year Federal Emergency Management Agency (FEMA) flood event of 8,500 ft^3/s, that is based upon a 1976 Flood Study by the Army Corps of Engineers (USCOE, 1976). Downstream of Rush Creek, 11,000 ft^3/s would result in river flow less than the 100-year event as designated by FEMA. FEMA requires that any replacement bridge not increase the risk of damage to existing structures nor increase the Base Flood Elevation (most probable 100 year flood) more than one foot.

4.1 Bridge Replacement (site descriptions cited *from* Omni-Means, LTD, 2000)

Four bridges in Trinity County (Salt Flat, Bucktail, Poker Bar, and "Treadwell" on Steelbridge Road) will be replaced in order to accommodate 11,000 ft^3/s releases and associated tributary accretion in May. None of these bridges meets currently recommended design standards for water conveyance and debris clearance at the maximum prescribed flows, and the foundations of each appear to be inadequate to withstand the scouring action of the maximum prescribed flows.

The existing Salt Flat Bridge on Salt Flat Road, off of Goose Ranch Road west of Lewiston at River Mile 107, is a privately owned structure serving 27 parcels. The bridge is a single lane, 270-foot-long structure, 10-foot-wide, four-span railway car bridge. The river channel at this site is split at low flow. The left arm is a side channel constructed by USBR for fish spawning and habitat purposes.

The existing bridge at Bucktail on Browns Mountain Road, located about 0.25 miles northeast of Lewiston Road at River Mile 105, is a single span, 76-foot-long, 32 foot-wide , steel girder structure with pile-supported concrete abutments that is county owned, and services about 60 parcels. The replacement of Bucktail bridge includes a significant local channel improvement to accommodate a bridge of acceptable capacity. The required channel improvement consists of removal and grading of a portion of the right floodplain to accommodate the longer length required in a new bridge. The excavation will extend roughly 600-feet upstream and 150-feet downstream of the existing structure.

The existing bridge at Poker Bar on Bridge Road, is located 1.5 miles from State Highway 299, about halfway between the towns of Lewiston and Douglas City at River Mile 102. The

bridge consists of two privately owned, single-span, railway car structures crossing two main channels (left and right) of the Trinity River that serve 77 parcels. The structure over the right channel is 87-foot-long, 18-foot-wide, and constructed with twin side-by-side railway cars. The car beams are supported on four steel “H”-piles at each abutment. The existing structure over the left channel is 52-foot-long, 20-foot-wide and is also constructed with two side-by-side railroad cars supported on steel “H” piles at each abutment. A concrete retaining wall and two concrete filled, riveted steel caissons are present in front of each of the abutments.

The existing Treadwell Bridge is located off Steelbridge Road about 3 miles upstream (east) of Douglas City. It is a privately owned, single-lane bridge and serves 9 parcels. The structure is a four-span, 201-foot-long, 12-foot wide, railway car bridge supported on concrete piers and abutments. Foundation type is unknown at both abutments and at each of the piers. The right abutment is established in fill encroaching on the river flood plain. The left abutment is established in the bank along the left edge of the channel. Prior to initiating any pre-construction activities bridge owners would be contacted and rights of entry negotiated. Transfer stipulations after construction including required operation and maintenance must also be addressed.

Pre-construction efforts will include procurement of design services, permitting , surveys, design and geotechnical investigations (USBR, 2000). The initial project (first year) will be to perform exploratory drilling at the anticipated bridge pier locations to determine depth to bedrock. Actual construction would occur in the second year. Total project time ranges from 17 to 28 months and depends on the construction window (the period of time equipment is allowed to work within the Trinity River wetted perimeter due to biological constraints). Assuming a time range of 17 to 28 months, projects that begin in summer 2000 (in pre-construction phase) would be completed by late 2001 to late 2002.

The construction window is roughly July 1 –September 15 of each year. In general, the following measures will be followed to reduce any potential impacts through the operation of heavy equipment:

- All sites will be surveyed for rearing coho in the immediate project area. Surveys for nesting owls and eagles will occur within a 0.5 mile radius of the project site prior to beginning work activities. The presence of coho will be determined by direct observation, beach seines or Electro-fishing. If a spotted owl or bald eagle nest site is located, scheduled work activities will be delayed (through July 10 for owls and August 31 for eagles) and/ or an alternate site will be selected and surveyed. Alternatively, NMFS will be consulted with to address any impacts to listed species.
- Heavy equipment operation will be conducted between July 1 and September 15.
- All mechanical equipment used shall be free of grease, oil, or other external petroleum products or lubricants. Equipment shall be thoroughly checked for leaks and any necessary repairs shall be completed prior to commencing work activities.
- No herbicides or pesticides shall be used.
- All possible measures will be taken to minimize any increased sedimentation/ turbidity in the mainstem from mechanical disturbance, such as leaving a small berm at the edge

of the channel to trap any sediments until all other work is completed. Turbidity and other water quality standards as identified in the "Water Quality Control Plan for the North Coast Region" and the Hoopa Valley Tribe Water Quality Control Plan will be monitored and maintained. If standards are not met, construction activities will cease until operations or alternatives can be done within compliance.

4.2 Structure Relocations

Structures at risk include at least one home, a number of mobile homes and trailers, various outbuildings and portions of access roads. Other improvements such as campgrounds, satellite dishes, garden and animal enclosures, mining operations and water systems would also be affected (USBR, 2000). Recognizing that implementation of the flows identified in the Preferred Alternative may affect these properties, mitigation measures may be appropriate and will be determined on a case by case basis. Affected land owners will be contacted, and right-of-entry and property modifications agreements negotiated to allow control surveys of structures.

The amount of time for home and structure relocation from initial identification and surveys to final actions is expected to be 18 months. Projects that begin in summer 2000 with structure identification and landowner contacts should be completed by summer 2001 to early 2002.

The limiting factor for initiation of high flows over 6,000 ft^3/s will therefore be construction of new bridges. If bridges are constructed by late 2001, flow increases above 6,000 ft^3/s would be allowable by spring 2002. Flows up to 6,000 ft^3/s could occur before houses and structures are relocated and before bridge construction is complete. It may be possible to release up to 8,500 ft^3/s prior to replacement of the Bucktail and Poker Bar bridges, if planned foundation investigations indicate that these bridges would not be damaged by the scouring action of flows of this magnitude. However, replacement/modification of all four bridges is necessary for safe implementation of Lewiston Dam releases of 11,000 ft^3/s/s in an extremely wet year.

5. Watershed Protection Program

5.1 Watershed Protection

Roughly 80 percent of the lands within the Trinity River basin are federally managed. Of the remaining 20 percent of the Trinity River basin that is privately owned, roughly half (10 percent of the total) are industrial timberlands, with the remainder being small private holdings. The majority of industrial timberlands within Trinity County are owned by Sierra Pacific Industries (SPI). SPI does not permit access to their lands for non-employees for watershed inventories, stream inventories or publicly funded restoration projects. Therefore, the majority of work is likely to occur on federal lands within the basin in the near future, although county and non-industrial private roads require substantial improvements as well. In addition, other industrial timberland owners such as Simpson and Timber Products do participate in restoration projects.

To date, Trinity River Restoration Program (TRRP) funds expended on watershed restoration activities have largely gone to the Trinity County Resource Conservation District

(TCRCD), the U.S. Forest Service and the USDA - Natural Resources Conservation Service (NRCS) and Yurok Tribe. The relatively stable workload enables NRCS to maintain a field office and engineer in Weaverville. TCRCD and NRCS and Yurok Tribe have successfully leveraged funds from the TRRP to obtain outside grant funding for watershed restoration throughout the Trinity River basin.

The Northwest Forest Plan applies to BLM and Forest Service lands and requires extensive road rehabilitation and road decommissioning projects as described in the Aquatic Conservation Strategy (ACS). The Forest Service budget provides for maintenance of only 20 percent of its total road mileage, with an accumulated backlog of $8 billion (U.S. Forest Service Chief Michael Dombeck, 1999) Road maintenance budget shortfalls for National Forest lands in the Trinity River basin are comparable. The Forest Service budget has not yet been adequately supplemented with road maintenance funding since the rapid decrease in timber sale revenues during the 1990's. The South Fork Trinity River and mainstem Trinity River (above and below Trinity and Lewiston Dams) are listed under Section 303d of the Clean Water Act as waterbodies impaired by sediment. The U.S. Environmental Protection Agency (USEPA) has completed a Total Maximum Daily Load (TMDL) for sediment in the South Fork Trinity River watershed. However, an implementation plan has not yet been approved by the North Coast Regional Water Quality Control Board (NCRWQCB). A TMDL for the mainstem Trinity River for sediment is scheduled for completion by USEPA in December, 2001.

The Forest Service, USEPA and the NCRWQCB are in the process of coordinating a "Northern Province TMDL Implementation Strategy for Forest Service Lands" (January, 2000). The Hoopa Valley Tribe is in the process of finalizing a Water Quality Control plan. The Shasta-Trinity National Forest (STNF) has yet to complete the necessary watershed analyses, Access and Travel Management Plans, NEPA documentation and funding for large-scale on-the-ground restoration activities pursuant to the Northwest Forest Plan and TMDL's to address sediment problems on National Forest lands. Conversely, the Six Rivers National Forest (SRNF) has made significant progress in completion of its Watershed Analyses, Access and Travel Management Plans, NEPA documentation and obtaining funding sources (including State funds) to complete the necessary road rehabilitation and decommissioning projects.

Roughly 600 miles of County roads within the Trinity River basin are maintained by Trinity and Humboldt counties, that are part of the "Five Counties Coho Conservation Program." The Five Counties Program includes Trinity, Humboldt, Del Norte, Siskiyou and Mendocino counties. State funding through the Proposition 204 Delta Tributary Watershed Program has been obtained to inventory and mitigate erosion and fish migration barrier problems associated with county roads within the Trinity River basin. Roughly $360,000 of the funding designated for California from the Pacific Coast Salmon Restoration Initiative will go toward county road improvement projects in the Trinity River basin. Depending on the county road inventory results, there could be a substantial need for additional funding to implement road-crossing problems on county roads. In particular, many culverts will likely need replacement with expensive bridges or natural-bottom culverts. One noteworthy distinction for county roads is that they must be usable year-round to serve residents, whereas other road systems are often seasonally utilized. The ongoing decline in Forest Reserve Fund payments to counties from reduced timber harvest activities has negatively

impacted the abilities of Humboldt and Trinity counties to adequately maintain, repair, and upgrade their road systems.

5.2 Description of Watershed Protection Work Activities

Road maintenance involves grading, rocking and clearance of drainage structures on existing roads to ensure that a minimum amount of erosion occurs. The current level of inadequate funding for road maintenance activities increases the risk of catastrophic failure of road fills when culverts and other drainage structures become plugged.

Road rehabilitation involves the upgrade of existing road systems, that have been determined to be necessary for long-term management purposes such as residential access, logging, recreation, fire protection, etc. Work consists of replacing undersized culverts with new culverts or bridges capable of accommodating a 100-year storm, associated debris, as well as fish passage in anadromous streams. Outsloping, rocking of roads, energy dissipaters, and the addition of new drainage structures to reduce the accumulation of water in inboard ditches are accepted methods of reducing erosion from road systems.

Road decommissioning is the removal of stream crossing structures, culverts, "Humboldt Crossings," and sometimes reshaping, ripping, seeding and mulching of the road surface, depending on slope, soil type and other conditions.

Grass Valley Creek Revegetation Program is the result of nearly 2 decades of investigations and restoration of the Grass Valley Creek watershed. The Trinity County Resource Conservation District is planting various native species to stabilize the highly erosive decomposed granite soils.

South Fork Trinity River Coordinated Resources Management Program (SFCRMP) is an ongoing cooperative watershed restoration effort . Efforts include road rehabilitation, road decommissioning, riparian improvements, water conservation and fish passage.

Lower Klamath Watershed Restoration is an ongoing cooperative effort between the Yurok Tribe, Simpson Timber, the State of California, with some funding provided by the Trinity River Restoration Program. Work consists primarily of road decommissioning and road rehabilitation. Public Law 104-143 extended the scope of funding authority under the Trinity River Restoration Program to the lower Klamath River between Weitchpec and the Pacific Ocean.

5.3 Prioritization of the Work/Implementation Plan

Watershed restoration priorities must address the physical, biological and legal issues associated with the Trinity River. The following criteria are recommended:

1. Tributary watersheds located between the North Fork Trinity confluence and Lewiston Dam shall be the highest priority.
2. Key watersheds designated pursuant to the Northwest Forest Plan
3. Refugia stream reaches noted for accommodating wild stocks of salmon and steelhead and/ or listed species pursuant to/ under the Endangered Species Act.

4. Roaded stream crossings at risk of catastrophic failure or migration barriers for anadromous fish.

5. Lands that are available for restoration because of landowner permission and/ or completion of environmental compliance and permitting (Watershed Analysis, NEPA/ CEQA/ CWA 404, 401, etc.).

6. Projects that provide a cost share from the landowner/ agency or other funding sources.

7. Sub-watersheds identified as priorities through the TMDL, as well as State and Tribal Water Quality Control Plan processes and monitoring programs.

8. Projects that allow continued collaboration through the restoration infrastructure of TCRCD and NRCS.

A significant decrease in the road mileage of the Trinity River Basin, in combination with the upgrade of integral roads, will shrink the size of the required overall road maintenance budgets.

5.4 Funding Sources

Watershed Restoration work in the Trinity River basin is currently funded through a variety of sources. Trinity River Restoration Program appropriations to the Bureau of Reclamation through the Energy and Water Development Appropriation Acts have historically been the single largest funding source in the Trinity River Basin restoration activities. Restoration of Grass Valley Creek, the South Fork Trinity River Coordinated Resource Management Plan (CRMP) Program and other activities have been extensively funded for many years by Reclamation to the TCRCD, NRCS and others. However, federal budgets have been cut and funding needs for restoration of the mainstem Trinity River fishery will increase through implementation of this ROD.

In recent years, Trinity County, the Trinity County Resource Conservation District, Six Rivers National Forest and others have obtained funding from other sources for supporting programs. The following is a brief list and description of potential funding sources available for watershed restoration in the Trinity River basin:

- S.B. 271 (California Salmon and Steelhead Restoration Account) This program is funded by the State of California through Tideland Lease revenues and the General Fund. A maximum of $8 million/ year will be available through this for allocation through 2005, with three additional years to implement funded projects. This program places a high priority on watershed assessment and upslope watershed restoration activities. Over a million dollars of this funding has been allocated to projects in the Klamath-Trinity basins in 1997-99. Matching funds are encouraged, but not required.

- Clean Water Act Section 205j and 319h- these funds are available through the State Water Resources Control Board for water quality planning/ monitoring and non-point source reduction, respectively. Significant non-federal matches are required, and contracting procedures are detailed and time-consuming. Historically, little funding has been made available to Trinity River basin projects through these programs because other funding is available in the Trinity River basin, that is not available elsewhere in the State.

- Pacific Salmon Restoration Initiative- Roughly $9 million was made available in FY 2000 through the Department of Commerce budget (NOAA/ NMFS). Trinity and Humboldt counties intend to spend the funds on highest priority projects, that pose both erosion problems and fish passage barriers. Significant non-federal matches are required.
- USFS and BLM appropriated funds for land and watershed management.
- County road funds- in some cases, these funds may be available as a non-federal match for other funding sources, especially if an existing county road would otherwise require some sort of maintenance or improvements.
- Jobs in the Woods- In recent years, BLM has been dedicating a portion of its funds in this category for restoration and sediment reduction work in the Grass Valley Creek Watershed, primarily through the TCRCD. Additionally, the TCRCD has applied for and received USFWS Jobs in the Woods funds to implement watershed restoration throughout the Trinity River Basin.
- CVPIA Restoration Fund – An Interior Solicitor's Opinion states that these funds, appropriated by Congress from fees charged to CVP water and power users, could be used to implement this ROD. This could include watershed protection and restoration activities.
- Proposition 13 – In March, 2000, the voters of California approved a multi-million dollar bond act that can be used for fishery and watershed restoration activities that are part of this implementation program. The State of California intends to use these funds to provide the non-federal match for the Pacific Salmon Restoration Initiative.

6. Adaptive Environmental Assessment and Management

Alluvial river systems are complex and dynamic. Our understanding of these systems and our ability to predict future conditions are continually improving. Adaptive Environmental Assessment and Management (AEAM) gives decision makers the ability to refine previous decisions in light of the continual increase in our knowledge and understanding of the river and catchment.

The AEAM approach to management relies on teams of scientists, managers, and policy makers jointly identifying and bounding management problems in quantifiable terms (Holling, 1978; Walters, 1986). In addition, the adaptive approach "to management recognizes that the information on which we base our decisions is almost always incomplete" (Lestelle et al., 1996). This recognition encourages managers to utilize management actions to increase our knowledge of complex systems, that, in turn, results in better future decisions. AEAM need not only monitor changes in the ecosystem, but also develop and test hypotheses of the causes of those changes, in order to promote desired changes. The result is informed decisions and increasing certainty within the management process.

AEAM is a formal, systematic, and rigorous process of learning from the outcomes of management actions, accommodating change, and improving management (Holling, 1978). Traditional approaches to management of rivers are inadequate to preserve biotic community diversity evidenced by single species management, complexity of species

interactions and interrelationships, and limited scientific knowledge about the interactions of abiotic and biotic factors. The concept of ecosystem management is not new; its implementation in regulated rivers is. It is important to stress not just flow recommendations and non-flow channel alterations but also the implementation of a new paradigm of river management built on the two-decade-old concept of Adaptive Environmental Assessment and Management [see also Hilborn and Walters (1992)].

An AEAM organization combines assessment and management. Most agency and task force structures do not allow both to go on simultaneously (International Institute for Applied Systems Analysis, 1979). The basis of adaptive environmental assessment and management is the need to apply lessons learned from past experience, data analysis and fine-tuning project implementation. AEAM combines experience with operational flexibility to respond to future monitoring and research findings and varying resource and environmental conditions. AEAM uses conceptual and numerical models and the scientific method to develop and test management choices. Decision makers use the results of the AEAM process to manage environments characterized by complexity, shifting conditions, and uncertainty about key system component relationships (Haley, 1990; McLain and Lee, 1996).

Effective management strategies must have explicit and measurable outcomes. There are few clear-cut answers to complex population biology, hydraulic, channel structure, and water quality changes. The AEAM process allows managers to adjust management practices (such as reservoir operations) and integrate information relating to the riverine habitats and the system response as new information becomes available.

A well-designed AEAM organization: (1) defines goals and objectives in measurable terms; (2) develops hypotheses, builds models, compares alternatives, designs system manipulations and monitoring programs for promising alternatives; (3) proposes modifications to operations that protect, conserve and enhance the resource; (4) implements monitoring and research programs to examine how selected management actions meet resource management objectives; and (5) uses the results of steps 1-4 to further refine ecosystem management to meet the stated objectives. The intention of the AEAM organization is to provide a process for cooperative integration of water control operations, resource protection, monitoring, management, and research.

The concept of restoring the natural hydrograph pattern discussed by Poff et al. (1997) is still debated, especially the role of hydrologic variability in sustaining the ecological integrity of river ecosystems. Stanford et al. (1996) also discuss ecological integrity. An adaptive management approach to increase our knowledge and management ability should be accompanied by physical process modeling and an evaluation program to monitor the physical and biological responses. Physical and biological processes will be modeled to facilitate the AEAM approach to restoring the unique fish fauna by designing a program for rehabilitating the river channels to provide habitats much improved over existing conditions. Such a program, similar to the recommendations by Ligon et al. (1995), needs to be supported by a rigorous prediction, monitoring and model validation program. The creation of an interdisciplinary team of scientists that run simulations, design and carry out monitoring programs, and offer recommendations to management is critical to successful implementation of the AEAM philosophy.

To adequately manage river systems for multiple use and conserve the biotic resources, on going monitoring of flow, sediment, geomorphic, and biological status is essential. With such data and the use of simulation models, river systems can be adaptively managed. Such informed decision-making, utilizing water supply forecasting and predictions of system response, is within the state-of-the art. Establishment of an AEAM organization will create a focused interdisciplinary effort involving physical and biological scientists. Peer review of all analyses, project design, and monitoring are essential to establish and maintain scientific and public credibility.

7. Organizing to Implement the Trinity River Restoration Program

The purpose of the Trinity River Restoration Program is to restore the basin's fish and wildlife populations to those that existed prior to construction of the TRD and to implement measures to restore fish and wildlife habitat in the Trinity River. An AEAM organization will implement the restoration program. The purpose of the Trinity River AEAM organization is two-fold. First, the AEAM organization will design and direct monitoring and restoration activities in the Trinity River basin. Second, the AEAM organization will provide recommendations for the flow modifications for the OCAP of the Trinity River Division (TRD) of the Central Valley Project, if necessary. The Rehabilitation Implementation Group will coordinate the federal fisheries restoration effort in the Trinity River watershed. For more information on specific biological and geomorphic objectives, and on the initial working scientific hypotheses of the preferred alternative, please refer to the TRFE, pp. 278-289.

Implementing the Trinity River AEAM organization requires a collaborative and cooperative approach among government agencies, tribes, landowners, and stakeholders. The Implementation Plan establishes a Trinity Management Council (TMC) that is responsible for organization oversight and direction. A Trinity Adaptive Management Working Group (TAMWG) provides policy and technical input (Technical Advisory Committees) on behalf of Trinity basin stakeholders to the TMC. Figure 1 shows the AEAM organization structure. The focus of the AEAM organization is the Trinity Management Council and an AEAM Team consisting of a Technical Modeling and Analysis Group (TMAG) and a Rehabilitation Implementation Group (RIG). The organization includes a support staff (AEAM Team) of engineers and scientists charged with assessing the Trinity River fishery restoration progress. The AEAM Team may recommend management changes based on annual assessments of the evaluation of rehabilitation and flow schedule activities. The AEAM Team coordinates independent scientific reviews of the AEAM organization. The AEAM Team works closely with the resource management agencies that are responsible for implementing specific Trinity River restoration program activities. For instance, the USDA Forest Service or BLM may carry out a channel rehabilitation project on their lands. They would do so in collaboration with the AEAM Team.

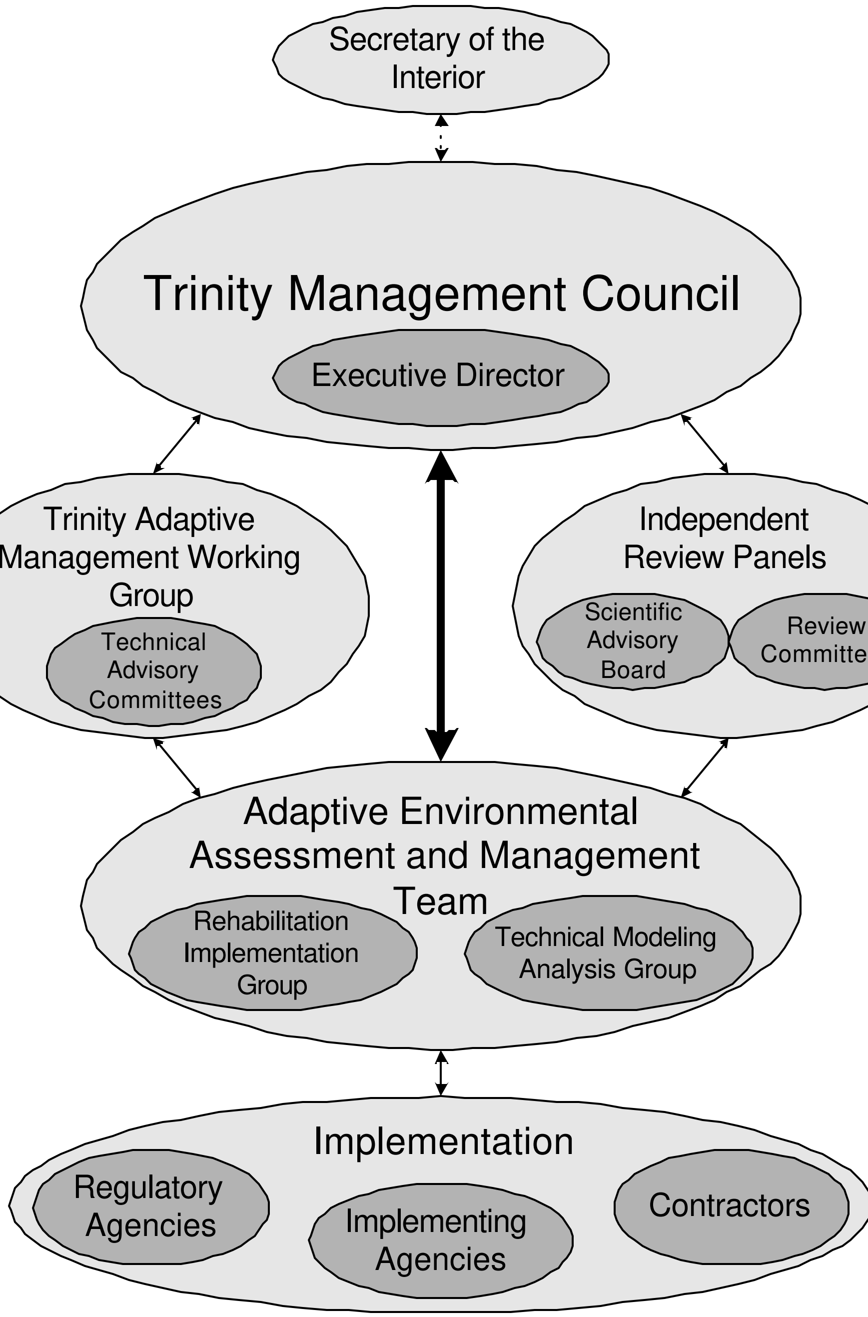

Figure 1 Trinity River Adaptive Environmental Assessment and Management organization structure.

The AEAM organization will be funded primarily by the U.S. Department of the Interior. The Trinity Management Council (TMC) and Executive Director will be the decision-making body for the organization, operating as a board of directors and advising the Secretary of the Interior. Within the overall AEAM organization structure are Stakeholder Groups, Independent Review Panels, Regulatory Agencies, and the Adaptive Environmental Assessment and Management Team.

The membership and staff specifications presented herein should be considered flexible as funding changes and the organizational scope matures. The AEAM organization staff should be stationed in a single location in northern California. The office should be in close proximity to the Trinity River Division (TRD) with reasonable travel accessibility for visiting managers and scientists.

Implementation of the TREIS/ R preferred alternative will be managed by the Trinity Management Council, and Executive Director, and carried out through individual agencies (state, federal, and local) and tribes acting within their existing authorities as well as through contracts awarded through a competitive process. Implementation by federal and state agencies is subject to annual appropriations.

All agencies will retain their existing authorities. However, when the TMC recommends a particular project or program, agencies will be expected to undertake those projects. If agencies do not implement the recommended actions or projects, they must explain to the TMC in writing why they have not done so.

7.1 AEAM Organization

The following sections describe the AEAM organization and each element of the structure including:

- Membership
- Roles & Responsibilities
- Staff

Finally, an example of assessment and monitoring based on the scheduling of the peak flow release during an extremely wet water-year follows the description of the organization elements.

7.1.1 Trinity Management Council (TMC)

Membership

Part-time designees from the following organizations:
US Fish & Wildlife Service (Service)
US Bureau of Reclamation (Reclamation)
US Forest Service
Hoopa Valley Tribe (HVT)
Yurok Tribe (YT)
State of California (designee from Secretary of Resources)
Trinity County
NOAA National Marine Fisheries Service

A Chairperson (Federal Agency) selected from the membership

Roles & Responsibilities

Has decision making authority for their agency/ organization
Interprets and recommends policy, stays out of day-to-day operations, similar to board of directors
Coordinates and reviews management actions
Provides organizational budget oversight

When necessary elevates unresolved conflicts within the council to the Secretary
Conducts search for and selects a nominee for Executive Director (actual hiring conducted within appropriate agency's personnel rules and regulations)
Reviews personnel actions by Executive Director
Authorizes and approves Requests-For-Proposals (RFP's) to be developed by Technical Modeling and Analysis Group
Ensures policy level consideration of issues submitted through Executive Director by regulatory agencies, stakeholder, and other management groups
Coordinates with other management groups and actions through the Executive Director
Considers proposed modifications of the annual flow schedule
Hires and supervises the Executive Director through a lead Interior agency as determined by the Secretary

Staff

Federal, Tribal, State, and local governing agencies – Existing staff
Staff 1/ 10th-time
Travel and Incidental Expenses

Executive Director

Executes policy and management decisions of the Trinity Management Council
Is the focus for all and oversees all activities of the Trinity River AEAM Organization. Coordinates with agencies implementing specific program elements

Membership

Full-time Executive Director
Full-time Administrative Assistant

Roles & Responsibilities

Hired and supervised by a lead Interior agency as determined by the Secretary
Coordinates execution of all TMC decisions through the Adaptive Environmental and Assessment Management Team
Hires Administrative Assistant and AEAM Team members subject to TMC authority
Acts as point of contact for public relations
Supervises the Adaptive Environmental Assessment and Management Team and coordinates the Independent Review Panels (including the Scientific Advisory Board (SAB)) the TMC, Stakeholder Groups, and Regulatory Agencies.
Coordinates flow schedule and rehabilitation activities with other operational agencies
Schedules and conducts information exchange workshops with stakeholders & regulatory agencies
Submits annual flow schedule to TMC for review and approval
Submits annual budget to TMC for review and approval
Monitors budget expenditures
Secures necessary permits for all program activities
Reports progress towards restoration goals to TMC, Stakeholders, Regulatory Agencies, and the public

Staff

2 Full Time Equivalent (FTE) employees

7.1.2 Trinity Adaptive Management Working Group (TAMWG)

The Trinity Adaptive Management Working (TAMWG) group consists primarily of representatives of stakeholders, with participation from tribes, state, local, and federal agencies on the TMC with a legitimate intent to restoration of the Trinity River. The purpose of the TAMWG is to assure thoughtful involvement in the Trinity River restoration program, particularly the adaptive management process. TAMWG provides an opportunity for stakeholders to give policy and management input about restoration efforts to the TMC. TAMWG will be formally organized, including technical committees. The TAMWG may be chartered under the Federal Advisory Committee Act (FACA). TAMWG will hold at least two meetings per year of the full group, involving the public. The technical advisory committees may hold additional meetings with the TMAG to discuss technical issues, review annual flow schedules, and RFP's for implementation activities.

Stakeholders will have an opportunity to submit alternative hypotheses and/ or alternative restoration actions to the TMC for consideration in their capacity as an advisory group. The TMC will seek review of alternatives proposed by the Technical Modeling and Analysis Group (TMAG) and the Rehabilitation Implementation Group (RIG) (see discussions of TMAG and RIG).

Membership

Members of TAMWG should be senior representatives of their respective constituent groups with a legitimate link to restoration activities on the Trinity River. They should have authority to speak on behalf of their organization(s) and commit to following up TAMWG and TMC discussions with their colleagues. If the Secretary charters TAMWG under FACA, minimum membership qualifications should include at least the following:

Individuals are senior representatives of their organization(s) authorized to speak on their behalf and, where appropriate, commit funds.

Individuals should have extensive knowledge of the Trinity River Restoration Program and the Trinity Adaptive Management Organization.

Members should elect a strong and fair chairperson that recognizes when discussions stray.

Technical committee participants must have appropriate technical qualifications to engage in technical discussions.

TAMWG members should expect to commit at least 10 percent of their time to this effort.

Members of TAMWG technical committees should expect to commit at least 25 percent of their time to this effort.

TAMWG should/ will replace representatives on the Working Group or technical committees that do not actively participate or attend meetings.

May include representatives from these and other interests:

- Recreation
- Environment
- Landowners
- Commercial fishing
- Sport fishing
- Timber
- Power
- Agriculture

- Water users
- Agencies
- Others

Roles & Responsibilities

Provide policy and management recommendations on all aspects of the program to TMC via Executive Director

Develop and submit alternative hypotheses for consideration by TMC and potential analysis by TMAG and RIG

Recommend management actions and studies for RFP development and implementation

Staff

Provided by each stakeholder group

7.1.3 Adaptive Environmental Assessment and Management Team

This team provides expert support to the TMC as relates to both scientific evaluation of restoration progress and managements implementation. However, the team expertise is subdivided into staff focusing their efforts toward either management implementation or analyses and scientific assessment. The AEAM Team office should be in close proximity to the Trinity River Division (TRD) with reasonable travel accessibility for visiting managers and scientists.

7.1.3.1 Technical Modeling and Analysis Group (TMAG)

Interdisciplinary group of scientists, engineers, and technical specialists, responsible for conducting and managing complex technical studies and projects, and integrating the products of those studies and projects into management objectives and recommendations. Supervised by the Team Leader under the Executive Director. The TMAG conducts technical analyses, model projections for achieving restoration objectives, design for comparison with ongoing approaches, planning, peer review, and budgeting. The TMAG makes recommendations to the TMC through the Executive Director for implementation and testing of appropriate hypotheses. The TMAG recommends modifications to the annual flow schedule within the annual water year-type allocation. The TMAG oversees scientific evaluation and design of all rehabilitation projects including: bank rehabilitation, gravel augmentation, riparian re-vegetation, floodplain creation, sediment management, and watershed rehabilitation. The TMAG develops the scope of work for these actions. The TMAG serves as the Contracting Officer's Technical Representative (COTR). The TMAG shares some COTR responsibilities to the RIG.

Membership

Full-time Group Leader Interdisciplinary experience in water resources management or river restoration/ rehabilitation with expertise in biological and geomorphological sciences. Supervised by the Executive Director.

Four full-time, multi-disciplinary scientists/ engineers representing these disciplines:

- Fisheries Biology
- Fluvial Geomorphology/ Hydraulic Engineering
- Riparian Ecology/ Wildlife Ecology
- Water Quality/ Temperature

- Hill Slope Geomorphology/ Watershed Hydrology
- Information Management/ Computer Modeling

A part-time representative from USBR Operations (CVP) serves as a member of this team when formulating the annual flow schedule.

Roles & Responsibilities

Team members collaborate in:

- Habitat modeling and mapping, SALMOD, habitat quality (gravel quality), statistics, population modeling
- Sediment transport, channel response, channel design
- Riparian revegetation, regeneration, and encroachment and removal
- Water temperature and other water quality indicator modeling
- Information Management and GIS
- Flow release recommendations and annual flow schedule formulation
- Integration of appropriate models for describing the response of the stream corridor to management alternatives
- Watershed restoration

Evaluates previous year & historical monitoring results with respect to existing hypotheses
Re-visits scientific hypotheses as appropriate
Conducts sediment transport modeling, habitat modeling, temperature modeling and salmon production modeling
Integrates multidisciplinary information and identifies alternatives to resolve conflicting ecological management needs
Coordinates with operations and presents analyses to TMC for resolving conflicts and assessing management needs
Provides short term research project development and oversight
Conducts long-term trend monitoring development and oversight
Sets standards and protocols for monitoring information (datum, coordinate systems, reporting techniques and formats, etc)
Ensures effective data management, storage, analysis, and distribution
Solicits technical input review from stakeholder groups and regulatory agencies
Analyzes and submits implementation plans for scientific peer review
Coordinates review from Scientific Advisory Board and Review Committees
Submits designs in collaboration with the RIG for Rehabilitation Activities and Objective Specific Monitoring
Is responsible for RFP development and preparation of statements of work in cooperation with the RIG Contracting Officer
Contracting Officer's Technical Representative - assist in Objective Specific Monitoring and Rehabilitation Activities contracting
Provides program reporting
Completes special duties as requested by Executive Director

Staff

Six FTE's
Group Leader/ Scientist
Secretary
Four full-time technical staff (May include agency staff detailed under the Inter-Governmental Personnel Act)
Travel and Incidental Expenses - Computers, software, hardware, supplies
Technical support resources including modeling, data analysis, etc

7.1.3.2 Rehabilitation Implementation Group (RIG)

A group of engineers, technicians, and contract specialists responsible for implementing the on-the-ground design and construction activities associated with the AEAM organization. The group is supervised by a Group Leader who is under the supervision of the Executive Director. The Rehabilitation Implementation Group (RIG) collects design data, prepares designs, awards contracts, and manages construction for bridge replacements, rehabilitation projects, gravel augmentation, riparian revegetation, flood plain creation, objective specific monitoring, and sediment management projects. The RIG performs all necessary realty actions and environmental permit requirements including environmental compliance. Contacts the public to address implementation issues such as obtaining borrow and waste sites, access agreements, and maintenance agreements. The RIG works closely with the TMAG to achieve a common understanding of desired design concepts and coordinates construction activities to insure any rehabilitation activity modifications are implemented with full approval of the TMC.

Membership

Full time Group Leader with background in engineering and experience in management of river restoration programs. Directly supervised by the TMC Executive Director.
Civil Engineer
Engineering Technician/ Surveyor
Contracting Officer
Part-time support from:
Construction Inspector
Construction contract specialist
Realty Specialist
Field Engineer

Roles & Responsibilities

Preparing and implementing contracting for objective specific monitoring and rehabilitation activities upon approval of the TMC
Collaborates with TMAG and Executive Director on program implementation
Submits annual report to Executive Director on accomplishments, expenditures, and budget needs
<u>Channel Rehabilitation</u>
Collaborates with TMAG to develop design concept for each site and environmental review
Contacts property owners to explain concept and obtain right of entry
Collects design data, prepares location maps, performs field explorations
Coordinates with TMAG to obtain pre- and post-project monitoring
Prepares designs, cost estimates, and information on local contractors

Awards construction contracts
Performs management during construction including quality control and contractor payments
<u>Bridge Replacements</u>
Prepare design concept for each site
Contacts property owners to explain concept and obtain right of entry and maintenance agreements
Collects design data, prepares location maps, performs field explorations
Prepares designs and cost estimates
Awards construction contracts
Performs construction management
<u>Flood Plain Creation</u>
Collaborates with TMAG to develop design concept for each site and environmental review
In concert with gravel augmentation and fine sediment management and revegetation
Obtains/ Identifies inundation zones
Locates impacted flood plain improvements
Performs property surveys
Negotiates easements including structure removal/ relocation agreements
Remove/ Relocate existing structures
<u>Gravel Augmentation and Fine Sediment Management</u>
Collaborates with TMAG to develop design concept for each site and environmental review
Prepares designs and cost estimates
Awards augmentation contracts
Performs gravel placement activities
<u>Objective Specific Monitoring</u>
In concert with TMAG, select objective specific monitoring and rehabilitation activity contractors
Provide contract management for all monitoring activities
<u>Watershed Rehabilitation</u>
Coordinates with land management agencies

Staff

Four FTE's including:
Group Leader
Civil Engineer
Contracting Officer
Engineering Technician/ Surveyor

Travel and Incidental Expenses
Computers

7.1.4 Independent Review Panels

To assure scientific credibility all monitoring and studies will be awarded through a competitive process using RFP's and independent outside review panels. A Scientific Advisory Board will provide overall review and recommendations to the TMC relative to the science aspects of the AEAM organization. Specific Review Committees will be organized as needed to review rehabilitation, monitoring and study designs as well as proposals and reports.

7.1.4.1 Scientific Advisory Board

Five scientists, recognized as experts in the disciplines of fisheries biology, fluvial geomorphology, hydraulic engineering, hydrology, riparian ecology, wildlife biology, or aquatic ecology, form a Scientific Advisory Board (SAB). It is important that members serve a reasonably long term to reduce "get up to speed" expenses, but short enough that the organization periodically gets new ideas and perspectives. Members must be objective in keeping the science separate from policy. Each member serves a four-year rotating term. The Executive Director appoints the members of the Board from candidates nominated by the TMC, TMAG Team Leader, TAMWG, and Regulatory Agencies, based upon technical capability. They would meet at least once each year with the TMAG.

Membership

Part-time. Five recognized scientists in various disciplines. Time commitment roughly 5% – 10%/ yr that may come in periodic bursts of effort such as when the TMAG develops alternative hypotheses, study plans, flow recommendations, rehabilitation activities, and special data collection activities for the coming year.

Roles & Responsibilities

Scientific peer review of hypothesis testing, proposed annual flow schedules, short and long-term monitoring plans, research priorities.

Periodic review (roughly every 5 years) of the overall AEAM Organization

Review reports & recommendations produced by the Technical Modeling and Analysis Group.

Review suggestions for new or alternative hypotheses & methods of testing of existing hypotheses.

Staff

No additional staff. The TMAG will provide support. SAB members will be reimbursed for their time and travel at their current organizational or industry rates

Total Five FTE's

7.1.4.2 Review Committees

Outside review committees will be formed to review specific proposals and study designs. For each proposed Objective Specific activity a review committee of subject area experts, not directly involved with the proposed project or otherwise having a conflict of interest, will be solicited to provide recommendations on specific proposed activities. These peer reviews will provide recommendations on proposals submitted in response to RFP's.

Membership

Review Committee members will be selected from nominations by the SAB, AEAMT and TAMWG.

When no conflict of interest exists TAC members of TAMWG having appropriate expertise will serve on individual reviews.

Roles and Responsibilities

For each Trinity Restoration Program funded activity a specific Review Committee will be formed to provide input and recommendations relative to personnel qualifications and experience, study approach, statistical design, adequacy of proposed budget, etc.

7.2 Objective Specific Monitoring

Long-term monitoring evaluates the overall restoration effort, and also provides baseline and subsequent data for trend analyses. Long-term data include gaging data, sediment transport data, water temperature data, smolt outmigration data, adult escapement estimates, redd mapping, monitoring index reaches, and rehabilitation sites. Restoration program funded long-term monitoring will be awarded by contract or self-governance agreements if applicable to agencies, tribes, and contractors in response to RFP's authorized by the TMC.

Short-term monitoring seeks to evaluate cause and effect in the context of specific hypotheses, and competing hypotheses for specific calendar years given the water year runoff forecast, sediment input, and level of salmon escapement. Short-term monitoring may include studies such as water temperature-salmonid growth rates, delta maintenance needs, and riparian regeneration processes. Short-term monitoring may be needed simply to fill information gaps. To assure scientific credibility all monitoring and studies will be awarded through a competitive process using RFP's and independent review panels.

Membership

Personnel of successful applications from:

- Agencies
- Tribes
- Contractors

Roles & Responsibilities

Short-term specialized monitoring such as annual site specific data collection for hypothesis testing, would be contracted through annual solicitations from agencies, tribes, universities, and consulting firms by issuing Requests For Proposals (RFP's) and awarding annual or multiple year contracts

Long-term trend monitoring needs would be contracted with local Agencies and Tribes having technical expertise. The local agency and/ or tribe will prepare work plans and data collection designs based upon scopes of work developed by the TMAG. They will submit the work plans for scientific peer review and after appropriate review and modification the agencies and/ or tribes will be funded.

Implement monitoring projects as specified in contracts

7.3 Funding for ROD Implementation

Table 6 presents costs for implementation of the Record of Decision over a period of three years. The majority of funds are expected to come through the Department of Interior agencies. Additional program funding however may be obtained from the State of California, other federal agencies, and other sources (See section 5.4).

itemizes a further breakout of the objective specific monitoring costs for long and short-term monitoring and GIS maintenance and public information.

TABLE 6
Funding for ROD Implementation[a,b] (Amounts in Thousands of Dollars)

Activity	Year 1 ($)	Year 2 ($)	Year 3 ($)	Total 3 yrs ($)
Bridge Construction[c]	350	5,700	0	6,050
Houses/outbuildings[c]	125	225	0	350
Channel Rehab projects[c]	2,150	2,400	2,400	6,950
Watershed Restoration	2,000	2,000	2,000	6,000
Coarse and Fine sediments[c]	50	50	355	455
Objective Specific Monitoring[d]	5,640	5,176	5,176	15,992
AEAM Team (Staffing)[d]	2,025	2,025	2,025	6,075
TOTAL	12,340	17,576	11,956	41,712

[a]Estimated out-year costs. During the first 3 years, half of the channel rehabilitation projects will be constructed. Additional out-year funds will be necessary to complete the second half. Costs are assumed to be the same as the first half. For watershed restoration, $2 million annually for roughly 20 years is necessary. Annual coarse and fine sediment costs are expected to average $260,00 per year but will vary depending on needs identified through adaptive management. Adaptive management costs are approximated at $5.2 million per year indefinitely.

[b]Bridge and Infrastructure modifications are phased in (included in years 1 and 2) with the bulk reflected in year 2. Therefore, a true estimate for an “annual” budget would be best represented by year 3 at $11.8 million.

[c]Costs taken from USBR Mainstem Trinity Habitat and Floodplain Modifications Report (2/2000).

[d]Costs taken from Stalnaker and Wittler AEAM report (4/2000).

TABLE 7
Break Out Costs for Objective Specific Monitoring (1,000s of $)

Long term monitoring:	
Fish monitoring (escapement, smolt production, etc)	2,247
Fish monitoring and modeling (habitat, temp, SALMOD)	914
Channel morphology and riparian monitoring	330
Gaging stations	175
Hydraulic and sediment transport monitoring/modeling	160
GIS maintenance and public info	145
Subtotal	**3,971**
Short term directed monitoring	1205
TOTAL	**5,176**
Additional first year only cost (GIS system and gaging stations)	464
TOTAL FIRST YEAR COSTS	**5,640**

7.4 Peak Flow Release Example for Extremely Wet Water Year

The theory, objectives, and structure of the proposed adaptive environmental assessment and management (AEAM) organization are broadly described in the Trinity River Flow Evaluation Report (USFWS and HVT, 1999). The material presented in previous sections of this report provides more detail on roles, responsibilities, and budgetary needs of the organization. However, to date, there has not been a detailed example of how adaptive

management would actually be used to manage the Trinity River. As stated in the Trinity River Flow Evaluation Study:

> *"a well-designed AEAM program (1) defines goals and objectives in measurable terms; (2) develops hypotheses, builds models, compares alternatives, and designs system manipulations and monitoring programs for promising alternatives; (3) proposes modifications to operations that protect, conserve and enhance the resources; and (4) implements monitoring and research programs to examine how selected management actions meet resource management objectives."*

The following section provides an example of the AEAM process, using the magnitude and duration of the annual high flow release as the example.

7.4.1 High Flow Magnitude

Hypotheses:

- Bed and bar scour discourages riparian vegetation establishment, thereby maintaining salmonid spawning and rearing habitat (and salmonid production)
- Adequate bed mobility results in reduced fine sediment storage in surface layer, reduced embeddedness, and improved habitat for benthic invertebrates and salmon spawning (and salmonid production)
- Bar scour and re-deposition (combined with reduced fine sediment supply) flushes spawning gravels, improving salmonid egg-emergence success (and salmonid production)
- There is a quantifiable relationship between increasing discharge and the amount of bed and bar scour depth and deposition
- Higher flows occur more frequently during wetter water years

Objectives:

1. Mobilize D_{84} gravel bed surface on bars and riffles
2. Scour and re-deposit bars and riffles to a depth greater than 2 D_{90}'s

Empirical data show that flows greater than 6,000 ft^3/s cause general bed mobilization indicated by the D_{84} particle size on bars and riffles. In a mixture of river gravels, the D_{84} represents the size for which 84 percent of the particles are finer. Empirical data relating flow and hydraulic conditions to bed scour (Wilcock, 1995; McBain and Trush, 1997) show flows ranging between 8,000 ft^3/s and 16,000 ft^3/s cause relative scour depths (scour/D_{90}) greater than two over most of the bar/bed surface. Observations of bed scour at the Bucktail bank rehabilitation site indicate a peak flow of 11,400 ft^3/s caused relative bed scour ranging from several D_{90} layers deep down in the channel to 1.35D_{90} deep midway up the point bar. A combination of Bucktail site data and median values of the compiled empirical data resulted in an initial conclusion that a peak discharge of 11,000 ft^3/s should be released in Extremely Wet water years to satisfy the bar surface scour objective. AEAM will enhance ability to achieve specific objectives by: 1) continuing to add empirical data relating bed

scour to discharge at index sites, 2) developing/ utilizing models that better describe the physical processes that cause bed scour.

7.4.2 High Flow Duration

Hypotheses:

- Increasing, maintaining, and routing coarse sediment supply will increase number and extent of bars
- Increased number and extent of bars will increase quantity and quality of salmonid spawning and rearing habitat, and salmonid production will thereby increase.
- Removing delta-formed backwaters will allow coarse sediment to route through the reach from upstream reaches, further increasing the number and extent of bars.
- Transporting fine sediment at a rate greater than input will decrease fine sediment storage in the mainstem Trinity River
- Decreasing fine sediment storage in the mainstem Trinity River will increase pool depth, decrease embeddedness, and decrease percent fines in spawning gravels (thereby increasing salmonid production)

Objectives:

1. Transport coarse sediment in upper river (near Deadwood and Rush creeks) at a rate equal to input.
2. Transport fine sediment in upper river (near Deadwood, Rush, and Grass Valley creeks) at a rate greater than input

Combining high flow magnitude with duration determines the total coarse and fine sediment transport capacity of the mainstem Trinity River. Measurements have been and continue to be taken on the mainstem Trinity River and tributaries to develop relationships between flow magnitude and fine & coarse sediment transport. This information can be predicted virtually on a real-time basis.

<u>Objective 1</u>
Evaluate objective 1 by comparing coarse sediment transport rates at both the Lewiston (RM 110) and Limekiln Gulch gaging stations (RM 98) with cumulative coarse sediment input rates from Deadwood Creek and Rush Creek. On an interim basis, because the TRD has greater influence on mainstem sediment transport closer to the dam, use the Rush Creek and Deadwood Creek coarse sediment yield as the management objective (transport sediment on the mainstem at a rate equal to input from Rush and Deadwood creeks). The duration of high flow recommendations in the TRFES is based on extrapolation of measured data to a long-term record to estimate sediment transport needs for each individual water year. For Extremely Wet water years, the duration is 5 days at 11,000 ft^3/s. Tributary sediment yield is most dependent on peak flow magnitude (that is partially dependent on water year class, i.e., typically, the wetter the water year, the more coarse sediment delivered to the mainstem); therefore, there is variability in year-to-year tributary sediment yields.

Objective 2
Evaluate Objective 2 by comparing fine sediment flux at the Limekiln Gulch gaging station with the estimated cumulative fine sediment yield from Deadwood Creek, Rush Creek, and Grass Valley Creek. Attempts to extrapolate fine sediment yield by water year class is more variable than coarse sediment.

7.4.3 Adaptive Management Example

Peak flows of five days' duration is the recommended starting point for the scheduled annual flows; in reality, peak flow duration should vary by the volume of sediment delivered to the mainstem Trinity River from tributaries for each individual water year (rather than averaging many years for a water year class). Using the coarse sediment management objectives as an example, AEAM would implement high flow recommendations based on the following real-time approach:

October 1 to April 1

1) Establish coarse sediment monitoring cross sections in mainstem Trinity River, focusing on the deltas (with large coarse sediment storage) and downstream reaches (with small coarse sediment storage).
2) Install bed mobility and scour projects at representative study sites. Develop bed mobility and or scour models to predict as a function of flow magnitude.
3) Monitor the volume of coarse sediment delivered to the mainstem Trinity River by tributaries by natural storm runoff events, particularly from Rush Creek. Summarize the volume of coarse sediment contributed by each tributary. For example, assume that 10,000 yd^3 of tributary derived coarse sediment needs to be transported by the mainstem during a given year.
4) Refine mainstem coarse sediment transport rates based on field measurements
5) Develop a hydraulic and sediment routing model for the upper portion of the mainstem Trinity River. Combine mainstem sediment transport relationship (input) with physical data downstream of tributaries into a sediment routing model (e.g., HEC-6 or better) to better calibrate model. This model will predict yd^3 of coarse sediment transported as a function of flow magnitude and duration, and will predict channel response (increasing or decreasing coarse sediment storage) at each cross section.

March 1 to April 1

6) Water supply forecasting to predict water year, culminating in a final water year designation on April 1. Assume an Extremely Wet year for this example.

April 1 to May 1

7) Because it is predicted to be an extremely wet year, the magnitude of the recommended flow is set at 11,000 ft^3/s to achieve bed/bar mobility and scour objectives.
8) Predict the duration of 11,000 ft^3/s flow release needed to transport 10,000 yd^3 of coarse sediment. Run sediment routing model predict the duration of 11,000 ft^3/s needed to transport 10,000 yd^3. Assume that model indicates 4 days. Therefore, the recommended duration of the 11,000 ft^3/s flow release is 4 days. Timing will be based on Chinook salmon smolt outmigration information; assume May 24-May 27.
9) This recommendation integrates into other team recommendations for that year and is forwarded to decision makers.

May 24-May 27

10) Conduct release.
11) Monitor coarse sediment transport to calibrate and improve sediment transport model
12) Monitor hydraulic parameters to calibrate and improve sediment transport model, bed mobility models, and bed scour models

May 27-July 22

13) Downramp flows to 450 ft^3/ s.
14) Begin reducing and analyzing data.

July 22-October 1

15) Monitor coarse sediment storage by resurveying cross sections. This will also evaluate the coarse sediment transport model predictions, and will help better calibrate the model for future predictions.
16) Monitor bed mobility and bed scour at representative study sites. Evaluate and calibrate bed mobility and bed scour models.
17) Analyze data, summarize results, prepare reports, and solicit outside scientific review of hypotheses, study plan, modeling, and results.
18) Revise hypotheses, study plan, and models as appropriate.

This approach greatly enhances our ability to achieve specific objectives, while allowing a much better predictive capability in each successive year (predict and monitor rather than simply reacting to long-term monitoring results).

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Attachment 1
Lewiston Dam Releases to the Trinity River

Date	Extremely Wet	Wet	Normal	Dry	Critically Dry
01-Oct thru 15 Oct	450	450	450	450	450
16-Oct thru 21-Apr	300	300	300	300	300
22-Apr	500	500	500	300	300
23-Apr	500	500	500	300	900
24-Apr	500	500	500	300	1,500
25-Apr	500	500	500	300	1,500
26-Apr	500	500	500	300	1,500
27-Apr	500	500	500	900	1,500
28-Apr	500	500	500	1,500	1,500
29-Apr	1,500	2,000	2,500	2,500	1,500
30-Apr	1,500	2,000	2,500	3,500	1,500
01-May thru 05-May	1,500	2,000	2,500	4,500	1,500
06-May	2,000	2,500	4,000	4,306	1,500
07-May	2,000	2,500	6,000	4,121	1,500
08-May	2,000	2,500	6,000	3,943	1,500
09-May	2,000	2,500	6,000	3,773	1,500
10-May	2,000	2,500	6,000	3,611	1,500
11-May	2,000	2,500	6,000	3,455	1,500
12-May	2,000	2,500	5,784	3,307	1,500
13-May	2,000	2,500	5,574	3,164	1,500
14-May	2,000	3,000	5,373	3,028	1,500
15-May	2,000	4,000	5,178	2,897	1,500
16-May	2,000	6,000	4,991	2,773	1,500
17-May	2,000	8,500 [a]	4,811	2,653	1,500
18-May	2,000	8,500 [a]	4,637	2,539	1,500
19-May	2,000	8,500 [a]	4,469	2,430	1,500
20-May	3,000	8,500 [a]	4,307	2,325	1,500
21-May	4,000	8,500 [a]	4,151	2,225	1,500
22-May	6,000	7,666 [a]	4,001	2,129	1,500
23-May	8,500 [a]	6,833 [a]	3,857	2,037	1,500
24-May	11,000 [a]	6,000	3,717	1,950	1,500
25-May	11,000 [a]	6,000	3,583	1,866	1,500
26-May	11,000 [a]	6,000	3,453	1,785	1,500
27-May	11,000 [a]	6,000	3,328	1,708	1,500
28-May	11,000 [a]	6,000	3,208	1,635	1,500
29-May	10,444 [a]	5,690	3,092	1,564	1,500
30-May	9,889 [a]	5,322	2,980	1,497	1,497
31-May	9,333 [a]	4,977	2,872	1,433	1,433
01-Jun	8,778 [a]	4,655	2,768	1,371	1,371
02-Jun	8,222 [a]	4,354	2,668	1,312	1,312
03-Jun	7,667 [a]	4,072	2,572	1,255	1,255
04-Jun	7,111 [a]	3,809	2,479	1,201	1,201
05-Jun	6,556 [a]	3,562	2,389	1,150	1,150
06-Jun	6,000	3,332	2,303	1,100	1,100
07-Jun	6,000	3,116	2,219	1,053	1,053
08-Jun	6,000	2,915	2,139	1,007	1,007
09-Jun	6,000	2,726	2,062	964	964
10-Jun	6,000	2,550	2,000	922	922
11-Jun	5,664	2,385	2,000	883	883
12-Jun	5,359	2,230	2,000	845	845
13-Jun	5,071	2,086	2,000	808	808
14-Jun	4,798	2,000	2,000	774	774
15-Jun	4,540	2,000	2,000	740	740

Attachment 1
Lewiston Dam Releases to the Trinity River

Date	Extremely Wet	Wet	Normal	Dry	Critically Dry
16-Jun	4,295	2,000	2,000	708	708
17-Jun	4,064	2,000	2,000	678	678
18-Jun	3,845	2,000	2,000	649	649
19-Jun	3,638	2,000	2,000	621	621
20-Jun	3,443	2,000	2,000	594	594
21-Jun	3,257	2,000	2,000	568	568
22-Jun	3,082	2,000	2,000	544	544
23-Jun	2,916	2,000	2,000	521	521
24-Jun	2,759	2,000	2,000	498	498
25-Jun	2,611	2,000	2,000	477	477
26-Jun	2,470	2,000	2,000	450	450
27-Jun	2,337	2,000	2,000	450	450
28-Jun	2,212	2,000	2,000	450	450
29-Jun	2,093	2,000	2,000	450	450
30-Jun thru July 9	2,000	2,000	2,000	450	450
10-Jul	1,700	1,700	1,700	450	450
11-Jul	1,500	1,500	1,500	450	450
12-Jul	1,350	1,350	1,350	450	450
13-Jul	1,200	1,200	1,200	450	450
14-Jul	1,050	1,050	1,050	450	450
15-Jul	950	950	950	450	450
16-Jul	850	850	850	450	450
17-Jul	750	750	750	450	450
18-Jul	675	675	675	450	450
19-Jul	600	600	600	450	450
20-Jul	550	550	550	450	450
21-Jul	500	500	500	450	450
22-Jul to 30 Sep	450	450	450	450	450
Acre-Feet (Thousands)	**815.2** (721.1)[b]	**701.0** (671.3)[b]	**646.9**	**452.6**	**368.6**

[a]Releases restricted to 6,000 ft³/s until floodplain improvements have occurred

[b]Annual allocations that reflect a maximum Lewiston Dam release of 6,000 ft³/s until floodplain improvement projects are completed.

Attachment 2. Memorandum from USFWS to USBR February 5, 1997. Page 1 of 2.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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Feb 5, 1997

Mr. Paul Fujitani
U.S. Bureau of Reclamation
Central Valley Operations
Sacramento, CA 95821

Subject: Down ramping from unscheduled winter flows in the Trinity River.

We appreciate your invitation to provide assistance in evaluating the current ramping schedules used on the Trinity River system. In particular, we would like to provide some input regarding stranding of salmonid sac-fry and fry during the winter storm season and how down ramping schedules could be modified to help protect these early life stages.

General Information

Evaluation of stranding of salmonids in the Trinity River has been conducted in the past. During the time the Flow Evaluation was being conducted by the Service, staff assessed stranding of juvenile salmon and steelhead. Typically these surveys occurred after scheduled high flow events which occurred in late Spring. These surveys used direct observation with mask and snorkel to determine presence or absence of fish in areas behind the berms adjacent to the Trinity River. Results of these studies and others (CH2M Hill 1990, Bauersfeld 1978, Hamilton and Buell 1976, Hunter 1992, Bradford et al. 1995, Olson and Metzgar 1987) found reduced stranding with increased fish size (>50 mm).

While stranding of juveniles (> 50 mm) does not appear to be a problem in the Trinity River, more recent studies on the Trinity River have indicated that stranding of the earlier life stages (< 50 mm)(sac-fry and fry), can be significant (Memo to files from Zedonis, April 5, 1996 and memo to the Bureau of Reclamation from CDFG, April 12, 1996). During these studies, it was found that many sac-fry, fry, and a few juvenile salmonids were stranded when unscheduled flows were reduced using the current OCAP ramping schedule (Table 1). Although not studied in the Trinity, stranding of aquatic insects, a popular food source for salmonids, probably also occurs (Gislason 1985).

Timing of Down ramping can also influence the rate at which sac-fry and fry can be stranded. During the winter months, when water temperatures are cold, fry are generally found hiding in and around cover objects near the waters edge during the daylight hours (Zedonis pers. comm and many others). Because flow reductions during this time are generally not sensed by these fish, they become stranded (Bradford et al. 1995). Contrary to day-time, salmonid fry and

Attachment 2. Memorandum from USFWS to USBR February 5, 1997. Page 2 of 2

juveniles become more active and less dependent on cover items during the night in the winter (Zedonis pers. comm; Campbell and Neuner 1985) and therefore are less vulnerable to stranding (Woodin 1984, Bradford et al. 1995).

Recommendations

In light of the information provided, and the possibility of this years flows resulting in some stranding, the Service would like to recommend the following conservative ramp schedule to better protect early life stages of salmonids and aquatic invertebrates.

1. Limit fluctuations in flow during the incubation and early rearing periods (January thru March) to prevent cumulative loss of fry and sac-fry.

2. Slow down ramping to levels below those listed in the OCAP report during the winter months when fish are small and more susceptible to stranding (see Table 1).

3. Limit flow reductions to night-time hours during the winter months.

4. Conduct studies, when opportunities arise, to better ascertain limitation and or refinements to these recommendations.

Table 1.

If existing release is:	Rate of Change (ft^3/sec)	
	Existing OCAP Decrease	Recommended Decrease
Above 6,000	500 per 4 hr	500 per 4 hr
6,000 to 4,000	500 per 4 hr	400 per 4 hr
2,000 to 4,000	500 per 4 hr	200 per 4 hr
500 to 2,000	200 per 4 hr	100 per 4 hr
300 to 500	100 per 4 hr	50 per 4 hr

Should you have any questions or need additional information, please contact Paul Zedonis of my staff at 707-822-7201.

Sincerely,

Tom T. Kisanuki

(for) Bruce Halstead
Project Leader

Appendix D
DEIS/EIR List of Commentors, Thematic Responses, Comments and Responses to Comments

APPENDIX D

DEIS/EIR List of Commentors, Thematic Responses, and Comments and Responses to Comments

This appendix consists of three sections: (D1) a listing of the commentors responding to the Trinity River Mainstem Fishery Restoration DEIS/EIR, (D2) thematic responses, and (D3) public comments and the agencies' responses to those comments.

The public comment period for the DEIS/EIR began on October 19, 1999, and was scheduled to end on December 8, 1999 (64 FR 56364). However, the Service extended the comment period until December 20, 1999 (64 FR 67584). On December 27, 1999, the Service reopened the public comment period until January 20, 2000 (64 FR 72357). A complete listing of the agencies, organizations, and individuals who received the DEIS/EIR is shown in Appendix D1.

Appendix D2 contains the thematic responses to comments. After analyzing a number of comments, the agencies determined that numerous organizations and individuals were submitting comments that were substantially similar in their subject matter and the concerns they raised. As a result, the agencies developed thematic responses to specifically address those comments and to avoid repetition of responses and cumbersome text duplication.

While the vast majority of comments came from California, comments were also received from Washington D.C. and states including, but not limited to, Idaho, Montana, Nevada, Oregon, and Wyoming. Appendix D3 contains a complete list of the comments received and the agencies' responses to public comments.

A total of 1,009 letters and 5,436 preprinted postcards were received during the public comment period. In addition, a number of oral comments were received during the public hearings held in November 1999. The transcripts of these hearings are included in Chapter 5 as Attachment 3. Individual responses were not developed for issues raised at the hearings, as such issues were typically presented as statements and/or such issues have been addressed in Appendieces D2 and D3.

The comments provided during the meeting and in the postcards and the letters received required a total of 7,761 responses by the agencies. Among the letters received, approximately half were generated as either form or modified form letters. Generally, the oral comments and comments presented within the majority of the form letters and preprinted postcards required no more than ten individual responses, thus representing a small fraction of the total responses presented in this FEIS/EIR. By far, the majority of the responses presented in Appendix D3 were necessitated by comments received in the non-form letters submitted by interested individuals and organizations including, but not limited to: the irrigation districts, local water boards, municipalities and county agencies, state and federal agencies, and recreation and environmental groups.

Appendix D1
List of Commentors

APPENDIX D1

LIST OF COMMENTORS

Federal Agencies

U.S. Department of Agriculture

Forest Service, Klamath National Forest, Michael P. Lee, Designated Federal Official

U.S. Department of Commerce

National Oceanic and Atmospheric Administration, Pacific Fisheries Management Council, Jim Lone, Chairman

U.S. Department of Energy

Western Area Power Administration, P. Nannette Englebrite, Resource Planning Team Lead

U.S. Department of the Interior

Bureau of Indian Affairs, Pacific Region, Sacramento Area Office, Ronald M. Jaeger, Regional Director

Bureau of Reclamation, Native American Affairs Office Adrienne Marks, Policy Analyst

U.S. Fish and Wildlife Service, Klamath Fishery Management Council, Keith Wilkinson, Vice Chair

U.S. Environmental Protection Agency

Region IX, David Farrel, Chief, Federal Activities Office

State Legislature

Senator Wesley Chesbro, Senate District 2 (with 11 additional signatories)

- Senator John Burton
- Senator Tom Haydon
- Senator Patrick Johnston
- Senator Byron Sher
- Senator John Vasconcellos
- Assemblyman Mike Honda
- Assemblyman Fred Keeley
- Assemblywoman Kerry Mazzoni
- Assemblywoman Virginia Strom-Martin
- Assemblyman Howard Wayne
- Assemblywoman Patricia Wiggins

Senator K. Maurice Johannessen, Senate District 4

State Agencies

State of California

Department of Fish and Game, Broddick L. Ryan, Chief Deputy Director

Department of Transportation, Caltrans District 2, Andrea Redamonti, Local Development Review

Department of Water Resources, Division of Planning and Local Assistance,
William J. Bennett, Chief

Governor's Office of Planning and Research, State Clearinghouse, Terry Roberts,
Senior Planner

The Resources Agency of California, Mary D. Nichols, Secretary for Resources

Indian Tribes

Nor-Rel-Muk Nation, Raymond Patton, Tribal Chair
Karuk Tibe of California, Robert B. Rohde, Natural Resources Manager
Yurok Tribe, Susan Masten, Chairperson

Hoopa Valley Tribal Members

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Joie Colegrove
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1 letter with initials M. K. C.
1 letter with 19 Signatories
66 letters with Illegible Signatures

Colleges and Universites

California State University, Sacramento, William E. Avery, PhD.
Southwestern College, Steven J. Bossi

Environmental and Recreational Organization

Albion River Watershed Protection Association/ Friends of Salmon Creek
    Sierra Club—Mendocino Lake Group, Linda Perkins
American Whitewater, John T. Gangemi
California Trout, Board of Governors, Nick Di Croce
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    Michael P. Buckingham
California Floaters Society, Suzanne A. Tollefson, Legal Advisor
California Sportfishing Protection Alliance, Robert J. Baiocchi, Consultant
Citizens for Better Forestry, Joseph Bower
Conejo Valley Flyfishers, L.E. Martin III, DVM
Environmental Defense Center
    Spreck Rosekrans, Senior Analyst
    Brian Trautwein, Environmental Analyst
Federation of Fly Fishers, Daniel A. McDaniel
Fly Fishers for Conservation
Fly Fishing Outfitters, Peter Woolley
Flycasters, Inc., Mondy Lariz
Friends of Alhambra Creek
Friends of the Trinity River
    Letter with 11 Signatories on behalf of the Environmental Water Caucus
    Byron Leydecker, Chair
Gold Country Flyfishers, R.J. Broda, Chairperson
Gold Country Paddlers, Paul Clark, Conservation Chair
International Rivers Network, Elizabeth Brink, Associate Coordinator
Maidu Group of the Mother Lode Chapter, Alice Q. Howard, Conservation Chair
Marin Conservation League, Kathy Lowrey, President
Salmon & Steelhead Recovery Coalition, Jud Ellinwood, Coordinator
San Joaquin River Group, Allen Short, Coordinator
Santa Clara Valley Audubon Society, Craig Breon, Environmental Advocate
Santa Cruz Fly Fishermen, Thomas R. Deetz, M.D., Conservation Chair
Shasta Paddlers, Kevin Lewis, Conservation Director
Shasta Tehama Bioregional Council, Melinda Brown, Chair
Sierra Club, Redwood Chapter
    Margaret Pennington, Chair
    Teresa C. Tucker, Executive Committee
Six Rivers Paddling Club, Carol Krueger
Stanislaus Fly Fishermen, Inc., John T Murphy, Conservation Chairman
The Northcoast Environmental Center, Tim McKay, Executive Director

Trout Unlimited, Stephen D. Trafton, California Policy Coordinator
World Stewardship Institute
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Municipalities and Counties

City of Redding, Robert C. Anderson, Mayor
County of Del Norte, Board of Supervisors, David Finigan, Chairman
County of Humboldt, Board of Supervisors, Stan Dixon, Chairman
Humbolt County Fish and Game Commission, Denver Nelson
Shasta County Board of Supervisors, Glenn Hawes, Chairman
Trinity County Board of Supervisors, Ralph Modine, Chairman
Trinity County Counsel/ Board of Supervisors, Jim Smith, Former Supervisor
c/ o David Hammer, Counsel

Irrigation Districts and Power and Water Management Agencies

California Urban Water Agencies, Byron M. Buck, Executive Director
Central Valley Project Water Association
Jason Peltier, Manager
Serge Birk, Aquatic Biologist
Clear Creek Community Service District, Char Workman-Flowers, General Manager
Northern California Power Agency, George Fraser, General Manager
Northern California Water Association, Dan Keppen, Member and Government Relations
San Benito County Water District, John S. Gregg, District Manager
Sacramento Municipal Utility District, Brian Jobson, Principal Power Contract Specialist
Sacramento Regional Wastewater Treatment Facility, T. Wendell Kido, District Manager
San Luis Delta-Mendota Water Authority
Tehama-Colusa Canal Authority, Arthur R. Bullock, General Manager/ Civil Engineer
Trinity County Public Utilities District, Board of Directors, Richard Adkins, President
Westlands Water District, James Snow, Assistant to the General Manager

Industry Associations

California Farm Bureau Federation, Brenda Jahns Southwick, Associate Counsel

Pacific Coast Federation of Fishermen's Associations, W.F. Zeke Grader, Jr., Executive Director

State Water Contractors, John C.Coburn, General Manager

Public Interest Groups

League of Women Voters, Byrd A. Lochtie, President

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Dash Stolarz
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Ryan Matthew Watts
Sandy Watts
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Nell Weatherwax
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L. Williams
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Saki Winship
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Chad Wohzford
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Kelsey Wolf-Cloud
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Vince Wolfe
James T. Wolff
Brox Wolfgang-Johanna
Alice Wolfson
Alan R. Wolshi
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D. Christopher Xenz

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Darren Young
Gerald C. Young
Jason Young
John R. Young
Joseph Young
Linda Young
Lucinda Young
Paul & Carol Young
Ryan Young
F. Chandler Young, Jr
Mark Younger
Andrew Youngmeister
Katherine Youngmeister
Simon Yu
Susan Yule
Larry Yuva

4 Letters with First Name Only
- Klaus and Paula
- Linda V.
- Petunia
- Viviana

14 Letters with Illegibile Signatures
6 Letters with Multiple Signatories
- 3 Signatories
- 5 Signatories
- 6 Signatories
- 7 Signatories
- 8 Signatories
- 13 Signatories

16 Letters with No Signature

Zac Zachary
William J. Zahary
Jack Zajac
Rhea G. Zaks
Sandra Zaliosky
Elisabeth Zall
Bob Zamfall
Alfred R. Zashe
Janice Zaske
George Zastron
John Zaverl
Carol Zeidman
Harry Zelinka
Karl M. Zellner
Ann Zemer
Liz Zemke
Phil Zemke
Julian Zepeda
Mark Zerbe
M. Zibinski
Helen R. Zike
Anna-Margrethe Zimmerman
Fred E. Zimmerman
Jeff Zochke
Ronald A. Zuber
Seth Zuckerman
Richard Zukin
Frank Zungolo
Leanne Zunigen
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Appendix D2
Thematic Responses

APPENDIX D2

Thematic Responses

Fisheries Resources Thematic Responses

Many of the comments received on the DEIS/EIR focused on the Trinity River fishery resources analysis. The thematic responses listed below were written to address comments and clarify misconceptions and misunderstandings held by a number of reviewers. In general, the information and analyses presented in the DEIS/EIR remain fundamentally unchanged.

For convenience, thematic responses have been categorized based on general topics that garnered comments in the following manner:

Fisheries information and studies developed prior to the DEIS/EIR

- The Basis for Fisheries Analyses Performed in the DEIS/EIR

Approach used to evaluate alternatives

- Method Used to Evaluate Alternatives – Trinity River System Attribute Analysis Methodology (TRSAAM)
- Linkage Between Physical Processes, Fish Habitat, and Fish Populations

Additional Alternatives Presented by Commentors

- Alternatives Recommended by Commentors: Additional Mechanical Restoration and Alternative Flow Schedules
- Increasing Effectiveness of Releases by Accounting for Storm Flows

Other Factors Affecting Fisheries

- Comparison of Population Trends in Unregulated Rivers (Smith River and South Fork Trinity River) and the Mainstem Trinity
- Role of the Trinity River Hatchery
- Predator Control as a Means for Increasing Population

The Basis for Fisheries Analyses Performed in the DEIS/EIR

Several reviewers stated that the information collected on the Trinity River over the past 15 years was not used effectively in the DEIS/EIR. Others made comments regarding the Preferred Alternative and its relationship with the TRFES.

The lead agencies disagree with the assertion that information collected over the past 15 years was not effectively used in the DEIS/EIR. The information contained in the DEIS/EIR contains the most contemporary research pertaining to salmonid population restoration, much of it specific to the Trinity River. Additionally, the Trinity River Flow Evaluation Study (TRFES) was the culmination of the best available data relevant to providing recommendations for the restoration of Trinity River anadromous fishery resources to the Secretary of the Interior. These recommendations were then evaluated as one alternative in the DEIS/EIR. Information from the TRFES, in addition to information collected by the California Department of Fish and Game (CDFG), the Hoopa Valley Tribe, and the Yurok Tribe, was used for impact analysis as appropriate. These studies are the most recent and best available data for the Trinity River.

Ecological systems are extremely complex. Biologists and managers have often been unable to pinpoint and address the specific limiting factor, or have addressed the most limiting factor only to discover another factor now impedes the desired restoration. Acknowledging this complexity, restoration efforts have moved toward addressing fundamental problems with ecosystems to fix larger habitat issues. Inriver restoration, restoring normative flows to restore ecosystem processes/habitats and the populations that depend on them, is highly commended in academic/scientific circles. Restoring ecosystem processes is much more likely to address all native species concerned than examining the needs of a single life stage of a particular species (see thematic response "Linkage Between Physical Processes, Fish Habitat, and Fish Populations"). An ecosystem perspective and restoration not only addresses the needs of adult spawners, but also eggs, sac-fry, juveniles, and smolts of all salmonids, as well as geomorphic processes and riparian vegetation cycles that provide habitat for the native species of fish and wildlife in the Trinity River Basin.

Summary of the TRFES

The TRFES is a summary document of the studies that have been conducted since the 1981 Secretarial Decision with recommended actions to restore the anadromous fishery resources of the Trinity River. It is not meant to be an all-inclusive document, but to present the studies that were critical to the development of the recommendations for the restoration of Trinity River anadromous fisheries.

The overall restoration strategy of the TRFES (see Chapter 7 of the TRFES) is based on the assertion that anadromous salmonids in the Trinity River evolved in a dynamic and sinuous alluvial river channel, and this channel has become relatively straight and static because of

the Trinity River Division (TRD) operation. If naturally produced salmonid populations are to recover, therefore, the habitat on which they depend must be rehabilitated. The TRFES concludes that the most practical strategy to achieve fish habitat recovery is a management approach that integrates riverine processes and instream flow-dependent needs (see Figure 7.1 in the TRFES). This ecosystem restoration approach physically reshapes selected channel sections, regulates sediment input, and prescribes reservoir releases to (1) allow fluvial processes to reshape and maintain a new dynamic equilibrium condition and (2) provide suitable fish habitat (e.g., depth, velocity, and water temperatures).

This strategy does not strive to recreate the pre-TRD mainstem channel geomorphology. Several sediment and flow constraints imposed by the TRD cannot be overcome or completely mitigated. Therefore, the new alluvial channel geomorphology will be smaller in scale, but it will exhibit almost all of the dynamic characteristics of the 10 necessary alluvial attributes (presented in Chapter 4.8 and Appendix H of the TRFES), and should sustain at least a two-fold increase in salmonid smolt production over current levels.

Several individual key studies and evaluations provided the basis and rationale of the TRFES recommendations. They include:

(1) habitat preferences of salmon and steelhead, and estimates of the relative amounts of preferred habitats at various dam releases

(2) an evaluation of fish habitat change and fish use at channel rehabilitation projects

(3) water and sediment interactions and river channel shape (fluvial geomorphology)

(4) water temperature needs of salmon and steelhead, and dam releases necessary to meet those needs

(5) a juvenile salmon production model to evaluate habitat limitations

The results of these individual studies were evaluated by an interagency group of natural resources scientists and managers (representing U.S. Fish and Wildlife Service [Service], U.S. Bureau of Reclamation [Reclamation], National Marine Fisheries Service [NMFS], CDFG, Hoopa Valley Tribe, U.S. Geological Survey [USGS], and U.S. Department of the Interior [DOI]) at three week-long meetings. This group, using the best available data and information, integrated the study results to develop the final recommendations. These recommendations included variable dam release schedules, a channel rehabilitation program (initiated by mechanical means and maintained by flow), gravel supplementation, and an Adaptive Environmental Assessment and Management (AEAM) program. The rationale and science supporting the recommendations and key results are summarized below.

Habitat Preferences

PHABSIM (physical habitat simulation) was considered a state-of-the-art methodology in the 1980s and is still used today as a management tool. PHABSIM is a methodology/ model that attempts to quantify fish habitat by certain criteria, such as depth, velocity, substrate, and cover relative to flow (cubic feet per second [cfs]). The model compares the habitat preferences of an individual fish species/ life stage to the amount of preferred habitat for that species/ life stage available over a range of flows. The model uses this information to

produce an index of the relative amount of habitat (habitat availability) for specific life stages at specific flows.

Using PHABSIM, habitat availability of all freshwater life stages of chinook, coho, and steelhead was modeled on the Trinity River (see Section 5.1 and 5.2 of TRFES for detail). These habitat availability indices in the existing channel (integrated with temperature and life history components) were used to establish the spawning/ rearing base flows recommended for much of the year. Although the actions of the Preferred Alternative will change the channel shape and alter the habitat-flow relationships, these indices represented the best available and most complete data from which to generate a base flow recommendation. Habitat availability for all species and life stages that could be affected by flow releases were considered for the final recommendations.

Evaluation of Restoration Projects

Comparison of habitat availability indices in the existing channel and at channel rehabilitation sites indicated that the existing channel produces unstable amounts of habitat over a wide range of flows while the channel rehabilitation sites provided stable amounts of habitat over the same range of flows (see Section 5.2 of TRFES for detail). The consequences of unstable quantities of habitats are an increase in the likelihood that fish will be subject to unfavorable habitats resulting in increased mortality during dam spills or tributary accretion. When the amount of habitat decreases as flows increase, an increase in stress (and therefore susceptibility to disease, parasites, and sub-optimal growth), exposure to predation, and competition for the limited and fluctuating quantity of preferred habitat can occur. This results in the creation of a short-term survival "bottleneck." Hence, creating stable quantities of habitat would likely improve physical condition and increase survival of the early life stages and subsequent adult returns.

Evaluation of the Physical River Channel

Studies of the fluvial geomorphologic mechanisms of the Trinity River system provided necessary information on the hydrology and physical processes that shape and form the Trinity River channel and create salmonid habitats within it (see Chapter 4 of TRFES for detail). Prior to the TRD, the Trinity River channel was characterized by gently sloping point bars. (For a summary description of channel changes that have taken place, see Section 3.2.1 Geomorphology in the DEIS/ EIR). To gain a better understanding of what the Trinity River looked like prior to the TRD and how fish used the available habitat, nine pilot channel rehabilitation projects were built in the mainstem channel. These projects were designed to recreate point bars similar to those that existed before TRD operations led to the development of sediment berms along the channel. Point bars are important in providing the low velocity habitats used by salmonid fry life stages. Investigations of point bars revealed that they serve as building blocks of alternate bar sequences, which in turn provided the riffle-pool–run sequences that are known to provide the wide diversity of habitats needed by salmonid species and their different life stages.

To identify the cause-and-effect relationships that created the highly diverse and dynamic habitats beneficial to salmonids, the hydrology, geomorphology, and sediment budget of

the Trinity River were analyzed. Examination of the historic hydrology (1912-1995) revealed two annual events important to the maintenance of riverine habitats (prior to TRD): (1) high winter floods and (2) a snowmelt hydrograph. Historically, winter floods scoured the channel and routed coarse and fine sediments through the river system, and scoured vegetation off the gravel bars. Prior to the TRD, the snowmelt hydrograph provided increased flow to moderate water temperatures that aid emigrating smolts and immigrating adults, and inundated point bars to keep seed germination high on the flood plain. Evaluations provided estimates of the different historic types and degrees of geomorphic events that occurred in different water-year classes. It was found that all of these events and the sequence of these events were important for the riverine habitat maintenance in the Trinity River.

Based on scientific studies of the Trinity River (McBain and Trush, 1997; Section 5.4 in the TRFES), the physical processes and associated biological and ecological functions of these processes were identified (see Appendix H of the TRFES), and flow thresholds were determined. The key results of these studies indicated that (1) flow has to be sufficient in magnitude and duration to scour, transport, and deposit sediment throughout the river system; (2) flow is important to balance the sediment load, whereby the amount of gravel transported downstream by a given flow is roughly equivalent to that amount being input (e.g., from the tributaries); and (3) a continuous supply of coarse sediment needs to be added to the mainstem in areas where tributary input does not exist (i.e., directly below the dam).

Water Temperature Model

The Stream Network Temperature Model (SNTEMP), developed by the Service, was calibrated for the Trinity River and used to assess temperature-flow relations and recommend flows to meet target temperature criteria (see Section 5.5 of TRFES for detail). The SNTEMP model was calibrated over a broad range of hydrologic and meteorological conditions, using a weekly time-step. Given a dam release magnitude, water temperature, and hydrometeorological conditions (including tributaries), the model predicts water temperatures from Lewiston Dam to its confluence with the Klamath River at Weitchpec. The model was used to identify TRD releases to meet water temperature criteria/ targets for specific life stages of salmon and steelhead.

The SNTEMP model was used to identify Trinity River flow levels necessary to meet desired water temperature criteria for outmigrating salmonid smolts at the mouth of the Trinity River at Weitchpec for target dates during the spring and early summer. In extremely wet, wet, and normal water years, optimal smolt temperatures were sought, while in dry and critically dry water years, marginal water temperatures were sought. Differential temperature targets between select year-class groups were recommended to provide for variability and synchronicity of thermal regimes within the basin. SNTEMP, in combination with empirical data, was also used to evaluate temperature objectives established by the North Coast Regional Water Quality Control Board (NCRWQCB) for adult salmonids that over-summer (hold) in the river prior to spawning in the fall. The TRD dam releases were recommended to assure that temperature regimes were met under most meteorological conditions. The maintenance of cool water temperatures downstream of the

dams in the summer is necessary to provide suitable holding habitat that is no longer available.

Juvenile Salmon Production Model

The salmon production potential model, SALMOD, which was developed by U.S. Geological Survey—Biological Resources Division (USGS-BRD) for the Trinity River, was used to identify possible factors limiting production of chinook salmon in the Trinity River (see Section 5.6 of TRFES for detail). The model uses output from PHABSIM and SNTEMP models and other factors that are considered to limit chinook salmon production. The model output provides estimates of relative production (in numbers of smolts) given a set of conditions evaluated by the model. Model input conditions include increasing or decreasing adult escapement, variable dam releases, and water temperatures. Sensitivity analyses provided insight into factors potentially limiting production of salmon in the Trinity River. In general, the SALMOD model results indicated that (1) habitat conditions in the current channel severely limit the chinook salmon production potential of the Trinity River, and (2) increased rearing habitat is critical to restore and maintain salmonid populations. Although the information produced by SALMOD does have its limitations (it only accounts for the first 25 miles downstream of Lewiston Dam, does not include the future benefits of a rehabilitated channel and restored fluvial process, and only addresses chinook salmon juvenile production), it does provide useful information on current limiting factors to salmonid production.

TRFES Recommendations

The integration of these studies identified five different water-year classes, the physical and biological processes/ objectives that were accomplished during each of these year classes, and specific thresholds necessary to meet those processes. These thresholds were integrated with salmonid temperature criteria (SNTEMP) and the examination of the flow-habitat relations (PHABSIM) for each water-year class. A different hydrograph was created for each of the five water-year classes (see Sections 8.1, 8.2, and 8.3 in the TRFES). Each hydrograph can be divided into the following basic components: (1) the summer/ fall period to provide adult holding habitat; (2) the fall/ winter period to provide adult spawning and fry/ juvenile rearing habitat; (3) the period during the spring to provide outmigration flows, temperature, and geomorphic peaks; and (4) the period with a descending hydrographic limb following peak flows. Mechanical channel rehabilitation was recommended to initiate the necessary channel shape change, which would otherwise require dam releases of at least 30,000 cfs. Sediment supplementation was recommended to re-establish the coarse sediment supply now blocked by the TRD.

Another important recommendation of the TRFES is the AEAM program, whereby studies are conducted that test hypothesis related to the results of the foundation studies previously described (see Sections 8.4, 8.5, and Appendix N and O of TRFES for detail). Through this program, studies are systematically conducted to evaluate and update management actions. The program offers a rigorous method of learning from the outcomes of management actions as experiments to guide future management.

In summary, the TRFES recommendations (and therefore the Preferred Alternative with the addition of the watershed restoration portion of the Mechanical Restoration Alternative) move away from single species management of salmon toward a more ecological or holistic system approach (e.g., Ward and Stanford, 1995; Stanford et al., 1996; Poff et al., 1997). The approach provides for the direct biological needs of spawning chinook salmon, which the original 120,500 acre-foot (af) allocation was based on, and the freshwater habitats that are necessary for chinook, coho, and steelhead to complete their life cycle. This approach is expected to succeed where other efforts toward the restoration of salmon have, by and large, failed. These failures can often be attributed to restoration efforts focusing on one particular life stage of one species.

Relationship of the TRFES to the DEIS/EIR and the Preferred Alternative

The DEIS/EIR focused on describing a reasonable range of alternatives that meet the purpose and need for the action. One of those alternatives incorporated the recommendations from the TRFES. Several alternatives were evaluated to determine their ability to restore and maintain natural production of anadromous fish on the Trinity River downstream of Lewiston Dam (see Section 1.2.1 of the DEIS/EIR). The DEIS/EIR also discloses the anticipated benefits and impacts associated with implementing each of the alternatives for several issue areas.

The Preferred Alternative incorporates the recommendations identified in the TRFES, plus additional watershed restoration activities as described in the Mechanical Restoration Alternative (see Section 2.1.6, page 2-26 of the DEIS/EIR). Screening criteria were used in the selection and development of the existing Preferred Alternative, which is the alternative that best meets the purpose and need while minimizing adverse impacts (see Section 2.1.1 of the DEIS/EIR). Details of the technical and scientific basis of the TRFES recommendations were not repeated in the DEIS/EIR to avoid redundancy, to present all alternatives in a similar manner, and to focus on the results of the impact analysis. Review comments for the TRFES were received and addressed on the TRFES prior to its finalization. Reference to the TRFES is made throughout the document regarding the science supporting the flow schedules and mechanical restoration activities of the Preferred Alternative, and as an aid to the interested reader in finding further detail.

References

McBain, S. and W. Trush. 1997. Trinity River Channel Maintenance Flow Study Final Report. Prepared for the Hoopa Valley Tribe, Trinity River Task Force. November.

Poff, N. L., J. D. Allan, M. B. Bain, J. R. Karr, K. L. Prestegaard, B. D. Richter, R. E. Sparks and J. C. Stromberg. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. BioScience 47 (11): 769-784.

Stanford, J. A., J. V. Ward, W. J. Liss, C. A. Frissell, R. N. Williams, J. A. Lichatowich, and C. C. Coutant. 1996. A general protocol for restoration of regulated rivers. Regulated Rivers: Research and Management 12: 391-413.

USFWS and HVT. 1999. Trinity River Flow Evaluation Final Report.

Ward, J.V., and J.A. Stanford. 1995. Ecological connectivity in alluvial river ecosystems and its disruption by flow regulation. Regulated Rivers: Research and Management 11: 105-119.

Method Used to Evaluate Alternatives—Trinity River System Attribute Analysis Methodology (TRSAAM)

Many reviewers commented on the Trinity River fishery resources assessment model, TRSAAM, that was used to evaluate the potential of each alternative to restore the fishery resources of the Trinity River. The basic content of their comments were: (1) TRSAAM did not provide adequate information for decision-making; (2) TRSAAM ignored biological factors and there was no link between attribute scoring and populations goals, carrying capacity, and biological linkages; (3) the assumptions of TRSAAM are "questionable," weighting the individual attributes/ objectives should have been considered, and the institutional record associated with TRSAAM should have been disclosed; (4) TRSAAM was biased towards the Preferred Alternative and the Preferred Alternative was developed using TRSAAM; (5) TRSAAM was not peer-reviewed and it should be replaced with a different methodology, such as SALMOD; and (6) TRSAAM should have examined safety-of-dam spills and accounted for tributary accretion.

Summary

The Fish and Channel Restoration Team (FCRT) was tasked with evaluating the fishery resource restoration potential of the alternatives developed by the lead agencies. The FCRT consists of fishery biologists, hydrologists, geomorphologists, and harvest management experts familiar with the Trinity River system. Team members represent various agencies including U.S. Fish and Wildlife Service (Service), National Marine Fisheries Service (NMFS), U.S. Geological Survey (USGS), U.S. Forest Service (USFS), California Department of Fish and Game (CDFG), Western Area Power Administration (Western), Hoopa Valley Tribe, Yurok Tribe, and Karuk Tribe.

SALMOD. When proposed alternatives were finalized, the only salmon production assessment model specific to the Trinity River was SALMOD, developed by USGS. The FCRT considered using SALMOD for impact analysis but decided that the model was limited in several important regards: it models only chinook salmon; it accounted for only 25 miles of river downstream of Lewiston Dam; it addressed only a portion of the year; the model did not assess the physical processes that create and maintain habitats important for the restoration of salmonid populations; and it required the extensive use of habitat-flow relationships, which were not available for describing future channel conditions. Given these limitations, the FCRT determined that SALMOD was not the appropriate tool for alternative analyses.

TRSAAM. The FCRT undertook the development of the Trinity River System Attribute Analysis Methodology (TRSAAM) model to assess restoration potential of the Trinity River fishery resources for each alternative (see Section 3.5, page 3-170 of the DEIS/ EIR and Appendix B, Attachments B2, B3, B12, and B13). TRSAAM assesses the potential of each

alternative to restore a functioning alluvial river and to create and maintain the habitats (by mechanical means or flow) necessary for the restoration of anadromous salmonid populations.

The attributes/objectives evaluated in this analysis directly address environmental conditions that are necessary for the success and productivity of various aquatic components of the Trinity River ecosystem, in particular salmonids. TRSAAM includes several components that have direct linkage to the biological needs of all freshwater life stages of salmonids. Attributes/objectives have direct linkages to biological needs and the desired physical processes, and biological responses are summarized in Attachment A to this thematic response. The rationale for managing physical processes to restore fish populations is further explained and justified in thematic response "Linkage Between Physical Processes, Fish Habitat, and Fish Populations."

Attribute/objective scores reflect the predicted ability of alternatives to support ecological processes. In general, high scores are associated with "natural" processes such as flooding, as these influence complex and wide-spread interactions between sediments, organic debris, and vegetation. Restoration efforts relying on mechanical means such as bulldozers or hand labor are inherently limited in terms of what can be accomplished and where benefits can be achieved. In cases such as achieving adequate water temperature conditions in the lower river, "snowmelt flood" releases from upstream dams are the sole viable alternative. The scoring of the majority of the attributes/objectives is based on specific frequencies and thresholds of flow and/or mechanical manipulations (presence or absence). The attributes/objectives and data used in TRSAAM are from McBain and Trush (1997) and USFWS and HVT (1999), both of which were peer-reviewed. These two documents represent and summarize the best data available for the Trinity River. Also, the thresholds for most of the attributes/objectives in TRSAAM are based on empirical science specific to the Trinity River. Modeled results or results from other published literature were used when empirical data specific to the Trinity River were not available; hence, the FCRT used analyses founded on the best available information and analytical tools to analyze the impact of alternatives on fishery resources of the Trinity River.

Assumptions and Scoring. All assumptions for the TRSAAM model (listed on page 3-171 of the DEIS/EIR) were extensively discussed and then agreed to by members of the FCRT. These assumptions were then applied equally to all alternatives evaluated. Differential weighting of attributes/objectives was discussed by the FCRT. The group's final conclusion was that there was no way to establish attribute weights that could be decisively defended because the complexity of ecological interactions confounded FCRT efforts to identify credible weighting factors. Therefore, the FCRT concluded there was no persuasive way to calculate discrete weights. Some reviewers commented that the scoring system of (0, 1, 2) used in TRSAAM was too narrow a range to allow accurate comparative analysis or that TRSAAM exaggerated the differences between the alternatives. TRSAAM was developed for impact analysis to distinguish between alternatives, and each alternative was evaluated equally, relative to the No Action Alternative. Therefore, this analysis meets the requirements of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), and development of a different scoring system is unnecessary.

Safety-of-Dam Releases. For the TRSAAM model, the FCRT chose to evaluate the flow releases as scheduled. Safety-of-dam releases were not evaluated due to the sporadic nature

of these events and the uncertainty of relying on chance events to restore anadromous fish populations and their habitats. Currently, the Operations Criteria and Plan (OCAP) for the Central Valley Project (CVP) provides that the Trinity River Division (TRD) is operated to avoid uncontrolled spills. Because each of the alternatives places different demands on TRD storage, the frequency by which safety-of-dam releases would occur also differs. For alternatives that increase releases to the Trinity River (e.g., the Preferred Alternative), the frequency of safety-of-dam releases decreases (see "Summary of Spills at Trinity Dam: Trinity Dam Restoration DEIS/EIR Flow Alternatives" in Appendix A of the DEIS/EIR). For further detail on safety-of-dam releases, see thematic response "Increasing Effectiveness of Releases by Accounting for Storm Flows."

Tributary Accretion. The attributes/objectives explicitly account for tributaries in terms of sediment input and temperature. The peak threshold flows identified for the attributes/objectives recommendations account for the amount of sediment input from the tributaries based on water-year class and provide a peak flow necessary to route this fine and coarse sediment input through the river system as a functional alluvial system. The peaks are different in each water-year class because distinct processes are targeted for each. Also, sediment input from tributaries is well correlated with water-year class. For instance, lesser peak flows are able to transport the relatively small volumes of sediment yielded to the mainstem from tributaries under drier conditions. SNTEMP, the temperature model calibrated for the Trinity River and used to identify flows necessary for smolt outmigration in the Trinity River Flow Evaluation Study (TRFES), also models tributary accretion. Hence, tributary accretion is accounted for in terms of balancing sediment input and meeting temperature objectives and criteria. Additionally, the TRFES divides the mainstem Trinity River into three different sections. Each section has different goals and objectives (see Chapter 8 of the TRFES) to identify appropriate management goals within each reach. For further detail on accretion, see thematic response "Increasing Effectiveness of Releases by Accounting for Storm Flows" and Responses 5306-9 and 5313-6.

Development of the Preferred Alternative and TRSAAM. Because the best available scientific information for the Trinity River was also used to develop recommendations contained in the TRFES, the perceived bias is understandable, but there was no intention to pre-select an alternative. If TRSAAM was the only tool used to select a preferred alternative, then the Maximum Flow Alternative would have been selected because it received the highest rating. The TRSAAM model was used to evaluate all alternatives after each alternative was developed. Representatives from the four lead agencies examined the TRSAAM output, as well as the outputs from several other models in different issue areas (such as hydropower, agriculture, and Sacramento River temperature model). The co-leads then developed the Preferred Alternative from two separate alternatives (see Section 2.1.1 of the DEIS/EIR).

Additional documentation on TRSAAM, its methodology and assumptions, and the scoring of attributes/objectives can be found in the DEIS/EIR Appendix B, Attachments B3, B4, B12, and B13.

Why TRSAAM Was Used

The modeling efforts conducted to assess the environmental effects of implementing the various alternatives represent use of the best and most appropriate science available. TRSAAM provides pertinent information for the decision-makers to distinguish the effects of the proposed alternatives on the fishery resources in the Trinity River. All alternatives were evaluated equally, allowing the decision-maker to objectively evaluate the environmental merits of each alternative in regard to the stated purpose and need. As such, these efforts more than satisfy the analytical requirements under both NEPA and CEQA.

TRSAAM was one of many models used for impact analysis for various issue area resources (see Figure 3-1, page 3-3 of the DEIS/EIR). Given the wide range of alternatives and all of the various models and subsequent impact analysis, the lead agencies believe there is sufficient information to make an informed decision.

References

McBain, S. and W. J. Trush. 1997. Trinity River Channel Maintenance Flow Study Final Report. Prepared for the Hoopa Valley Tribe, Trinity River Task Force. November.

USFWS & HVT (U.S. Fish and Wildlife Service and Hoopa Valley Tribe). 1999. Trinity River Flow Evaluation Final Report; June. Arcata, CA.

Attachment A. Attributes of Alluvial River Ecosystems: Physical Processes and Biological Responses (Source: USFWS & HVT 1999, Appendix H).

Attribute No. 1.
Spatially Complex Channel Morphology

No single segment of channelbed provides habitat for all species, but the sum of all channel segments provides high-quality habitat for native species. A wide range of structurally complex physical environments supports diverse and productive biological communities (Anderson and Nehring, 1985; Sullivan et al., 1987; Bisson et al., 1988; Hill et al., 1991).

Desired Physical Responses:

- An alternate bar morphology extending upstream from the present alluvial transition zone near Indian Creek.
- Development of a functional floodplain, now missing from the post-TRD channel morphology.
- Asymmetrical cross-sections in a meandering channel with a sinuous thalweg pattern.

Desired Biological Responses (if all annual hydrograph components are provided)

- Riparian community with all stages of successional development.
- No loss of riparian habitat with channel migration.
- Diverse salmonid habitat available for all life stages over wide-ranging flows, flood and baseflow (Hill et al., 1991; Reeves et al., 1996 in Poff et al., 1997).

Attribute No. 2.
Flows and Water Quality Are Predictably Variable

Inter-annual and seasonal flow regimes are broadly predictable, but specific flow magnitudes, timing, duration, and frequencies are unpredictable because of runoff patterns produced by storms and droughts. Seasonal water-quality characteristics, especially water temperature, turbidity, and suspended-sediment concentration, are similar to those of regional unregulated rivers and fluctuate seasonally. This temporal predictable unpredictability is a foundation of river ecosystem integrity (Hill et al., 1991; Poff et al., 1997; Richter, 1997).

Objectives for Physical Processes:

- Inundate lower alternate bar features during dispersion of riparian plant seeds.
- Provide variable water depths and velocities over spawning gravels during salmonid spawning to spatially distribute redds.
- Inundate broader margins of alternate bars, including backside scour channels, to create shallow slack areas between late winter and snowmelt periods for early life stage of salmonids and amphibians.
- Provide a favorable range of baseflows for maintaining high-quality juvenile salmonid rearing and macroinvertebrate habitat within an alternate bar morphology.

- Provide late-spring outmigrant stimulus flows.
- Rapid post-snowmelt recession stage to strand/desiccate seedlings initiating/establishing on alternate bar surfaces.

Desired Physical Responses:

- Restore physical/riparian processes associated with a snowmelt peak and recession hydrograph components below Lewiston Dam.
- Optimize available physical habitat for anadromous salmonids for all seasons.
- Restore periodic inundation of the floodplain and groundwater dynamics.

Desired Biological Responses (if all annual hydrograph components provided):

- Elimination of most woody riparian cohorts from exposed surfaces of alternate bars.
- Establishment of early-successional riparian communities on floodplains and terraces.
- Improved anadromous salmonid egg survival.
- Natural seasonal timing of hydrograph components to complement life-history requirements of native plants and animals.
- Greater channel complexity, more habitat, and higher water quality for all freshwater life-history stages of salmonids.
- Increased macrobenthic invertebrate productivity.

Attribute No. 3.
Frequently Mobilized Channelbed Surface

Channelbed framework particles of coarse alluvial surfaces are mobilized by the bankfull discharge (Leopold et al., 1964; Richards, 1982; Nelson et al., 1987) , which occurs on average every 1 to 2 years.

Objectives (every two of three years as an annual maximum):

- Achieve incipient condition for general channelbed surface.
- Surpass threshold for transporting sand through pools.
- Scour 1- to 2-year-old seedlings on alternate and medial bars.
- Frequently mobilize spawning gravel deposits.

Desired/Diagnostic Physical Responses:

- Mobilize surface tracer rocks (D_{84}) in general channelbed surface and exposed portions of alternate bars.
- Reduce coarseness of surface layer above Indian Creek.
- Reduce sand storage in riffle/run habitat and pools.
- Create local scour depressions around large roughness elements.
- Mobilize spawning gravel deposits several surface layers deep.

Desired Biological Responses (if physical processes achieved):

- Higher survival of eggs and emerging alevins by reducing fines (Tagart, 1984; Sear, 1995; Poff et al., 1997).
- Greater substrate complexity in riffle and run habitats for improved macroinvertebrate production (Boles, 1976; Nelson et al., 1987; Ward, 1998).
- Scour 1-and 2-year-old woody riparian seedlings along margins of alternate bars.

- Greater habitat complexity (micro-habitat features).
- Deeper pool depths/volumes for adult fish cover and holding (Platts et al., 1983; Nelson et al., 1987; Sullivan et al., 1987; Bisson et al., 1988; Barnhart and Hillemeier, 1994).

Attribute No. 4.
Periodic Channelbed Scour and Fill

Alternate bars are scoured deeper than their coarse surface layers by floods exceeding 3- to 5-year annual maximum flood recurrences. This scour is typically accompanied by re-deposition, such that net change in channelbed topography following a scouring flood usually is minimal.

Objectives for Physical Processes:

- Rejuvenate spawning gravel deposits.
- Kill 2- to 4-year-old seedlings establishing on alternate bar surfaces.
- Deposit fine substrate onto upper alternate bar and floodplain surfaces.

Desired Physical Responses:

- Close to dam, reduction in surface-to-subsurface D_{50} and D_{84} particle-size ratios.
- Significant scouring (several surface layers deep) of most alluvial features, including steeper riffles.
- Formation of alternate bar sequences upstream from Indian Creek.
- More alternate bars and developing bar sequences downstream from Douglas City.
- Increased diversity of surface particle-size distributions.
- Greater topographic complexity of side channels associated with alternate bars, especially distal portions.
- Increased pool depths for fish habitats (Nelson, 1987).

Desired Biological Responses (if physical processes achieved):

- Improved anadromous salmonid spawning and rearing habitat (Hill et al., 1991).
- Reestablishment of dynamic riparian plant stands in various stages of succession on higher elevations of alternate bars.
- Mortality of 3- to 4-year-old saplings on alternate bar surfaces to discourage riparian plant encroachment and riparian berm formation.
- Rehabilitation of habitat for riparian-dependent amphibian, bird, and mammal species.

Attribute No. 5.
Balanced Fine and Coarse Sediment Budgets

River reaches export fine and coarse sediment at rates approximately equal to sediment inputs. The amount and mode of sediment storage within a given river reach fluctuates, but channel morphology is sustained in dynamic quasi-equilibrium when averaged over many years (Sear, 1994; Poff et al., 1997).

Objectives for Physical Processes:

- Reduce fine sediment storage in the mainstem.
- Maintain coarse sediment storage in the mainstem.
- Route mobilized D_{84} through alternate bar sequence every two of three years, on average.
- Prevent mainstem accumulation of tributary bed material.
- Eliminate bedload impedance reaches.

Desired Physical Responses:

- D_{84} tracer rocks should negotiate alternate bar sequences; i.e., larger particles from upstream riffles should not accumulate in downstream pools.
- Reduced storage of fine sediment in riparian berms.
- Eliminate aggradation, and encourage slight degradation of bed elevation at tributary deltas (smooth-out longitudinal profile through these reaches).
- Increases pool depths.
- Maintains physical complexity by sustaining alternate bar morphology.

Desired Biological Responses:

- Improves and maintain spawning and rearing habitat quality without reducing quantity (Poff et al., 1997).
- Increases adult salmonid cover and holding (Nelson et al., 1987).
- Reduces riparian berms.

Attribute No. 6.
Periodic Channel Migration

The channel migrates at variable rates and establishes meander wavelengths consistent with regional rivers with similar flow regimes, valley slopes, confinement, sediment supply, and sediment caliber (Williams and Wolman, 1984; Chien, 1985, in Poff et al., 1997; Sullivan et al., 1987; Johnson, 1994).

Objectives for Physical Processes:

- Promote bank erosion in alluvial reaches.
- Floodplain deposition every 3 to 5 years.
- Create channel avulsions every 10 years on average.
- Encourage meander wavelengths 8 to 10 bankfull-widths long.
- Stored sediment in the floodplain is slowly released downstream.

Desired Physical Responses:

- Maintain channel width while channel migrates.
- Create sloughs through infrequent channel avulsions.
- Create side channels through frequent alternate bar reshaping.
- Increase meander amplitude and expression of the thalweg.
- Create water temperature variability within alternate bar sequences.
- Increase input of large woody debris along channel margins.

Desired Biological Responses (if all physical objectives achieved):

- Diverse age class structure in stands of cottonwood and other species dependent on channel migration.
- Full range of several stages in riparian plant communities.
- Increased habitat quality and quantity for native vertebrate species dependent on early successional riparian forests (Hartman, 1965; Bustard and Navver, 1975; Sullivan et al., 1987).
- High flow refuge and summer thermal refugia for amphibians and juvenile fish provided in rejuvenated scour channels.
- Increased habitat complexity by input of large woody debris from eroding banks.

Attribute No. 7.
A Functional Floodplain

On average, floodplains are inundated once annually by high flows equaling or exceeding bankfull stage. Lower terraces are inundated by less frequent floods, with their expected inundation frequencies dependent on norms exhibited by similar, but unregulated river channels. These floods also deposit finer sediment onto the floodplain and low terraces (Leopold et al., 1964; Sullivan et al., 1987; Poff et al., 1997; Ward, 1998).

Objectives for Physical Processes:

- Inundate the floodplain on average once annually.
- Encourage local floodplain surface deposition and/or scour by less frequent but higher floods.
- Have floodplain construction keep pace with floodplain loss as the channel migrates across the river corridor.
- Provide sufficient channel confinement to maintain hydraulic processes (Attributes Nos. 3 and 4).

Desired Physical Responses:

- Maintain channel width as river migrates.
- Increase hydraulic roughness and greater flow storage during high-magnitude floods.

Desired Biological Responses (if all physical objectives achieved:

- Increased woody riparian overstory and understory species diversity, compensating for woody riparian stands lost along outside banks of eroding meander bends.
- Keeps physical processes conducive for maintaining early-successional riparian dependent species, especially for birds and amphibians.

Attribute No. 8.
Infrequent Channel-Resetting Floods

Single large floods (e.g., exceeding 10- to 20-year recurrences) cause channel avulsions, widespread rejuvenation of mature riparian stands to early-successional stages, side channel formation and maintenance, and off-channel wetlands (e.g., oxbows). Resetting floods are as critical for creating and maintaining channel complexity as are lesser magnitude floods (Sullivan et al., 1987; Poff et al., 1997; Ward, 1998).

Objectives for Physical Processes:

- Form/Reshape alternate bar surfaces every 10 to 20 years, on average.
- Improve bedload routing by minimizing impedance of bedload transport past tributary deltas.
- Eliminate or minimize extent mature riparian vegetation stands on alternate bar surfaces and floodplains every 10 to 20 years.
- Deposit fine substrate on lower terrace surfaces once every 10 to 20 years.
- Provide infrequent deep scour high on alternate bars and on the floodplain.
- Construct and maintain (rejuvenate) natural side channels.
- Scour and redeposit entire alternate bar sequences every 10 to 20 years.

Desired Physical Responses:

- Deep scour (several D_{84} surface layers deep) in most alluvial features, including steeper riffles.
- Significant channel migration and infrequent channel avulsion.
- Alternate bar scour and redeposition.
- Extensive removal of saplings and mature trees in riparian stands.
- Increase complexity of natural side channels.

Desired Biological Responses (if physical processes achieved):

- Improve anadromous salmonid spawning and rearing habitats.
- Increase adult fish cover and holding habitat (Nelson et al., 1987).
- Create dynamic riparian stands in various stages of succession on higher elevations of alternate bars.
- Control populations of 3- to 4-year-old saplings on alternate bar surfaces close to channel center, and scour stands of mature riparian vegetation.

Attribute No. 9.
Self-Sustaining Diverse Riparian Plant Communities

Natural woody riparian plant establishment and mortality, based on species life history strategies, culminate in early- and late-successional stand structures and species diversities (canopy and understory) characteristic of self-sustaining riparian communities common to regional unregulated river corridors (Beschta and Platts, 1986; Ligon et al., 1995; Poff et al., 1997).

Objectives for Riparian Processes:

- Prevent woody riparian plant encroachment.
- Maintain early-successional woody riparian communities.
- Remove mature riparian trees established in the riparian berms.
- Eliminate widespread presence of riparian berms.
- Rehabilitate off-channel wetland communities.

Desired Biological Responses (if all physical objectives achieved):

- Floods periodically scour seedlings and saplings.
- Channel migration initiates new riparian cohorts.
- Channel avulsion creates oxbows and off-channel wetland habitats, initiating diverse patches of riparian stands.
- Woody riparian overstory and understory species diversity and age class distribution increases in floodplains.
- Greater habitat availability for wildlife dependent on early seral stages of riparian plant communities.

Attribute No. 10.
Naturally-fluctuating Groundwater Table

Inter-annual and seasonal groundwater fluctuations in floodplains, terraces, sloughs, and adjacent wetlands occur in a manner similar to that in regional unregulated river corridors (Stanford et al., 1996; Ward, 1998).

Objectives for Physical Processes:

- Naturally fluctuating seasonal groundwater elevation and surface-water elevations in scour channels and off-channel wetlands.

Desired Physical Responses:

- Maintenance of off-channel habitats, including overflow channels, oxbow channels, and floodplain wetlands.

Desired Biological Responses (if physical processes achieved):

- High diversity of habitat types within the entire river corridor (Poff et al., 1997; Ward, 1998).

Linkage Between Physical Processes, Fish Habitat, and Fish Populations

Some reviewers commented that there is no sound basis for the assertion that increases or improvements in salmonid habitat will result in increased fish production. Several commentors also criticized the DEIS/EIR, stating that the Preferred Alternative would not achieve the goals of the Trinity River Restoration Program (TRRP) and that the belief that restoring a functioning alluvial river would restore salmonid populations was a "leap of faith." The lead agencies disagree on both counts. Restoring the physical processes that produced the inriver habitats prior to the construction of the dam (i.e., the environment in which Trinity River salmonids evolved) will recreate and maintain the habitats necessary for healthy fish populations—healthy rivers support healthy fish populations. This premise is not a leap of faith, but an application of a recent paradigm shift not only in fisheries resources but all in natural resources management.

To further demonstrate this, a deterministic habitat capacity analysis was conducted to assess the ability of the Preferred Alternative to achieve the chinook spawning escapement goals of the TRRP. This deterministic approach was conducted to provide information independent of, but complementary to, the Trinity River System Attribute Analysis Method (TRSAAM) analysis of the Preferred Alternative and the stochastic analysis conducted using the U.S. Geological Survey—Biological Resources Division (USGS-BRD) salmon production model, SALMOD, that was developed specifically for the Trinity River (USFWS & HVT, 1999).

Rationale Behind the Focus on Physical Processes

The shift towards holistic management aimed at restoring natural processes, rather than focusing on individual species, is a result of management acknowledging that past efforts have failed to reverse the demise of salmonid stocks. Kauffman et al., (1997) states that nearly "85 percent of historical Pacific Northwest anadromous salmon stocks are either extinct, endangered, threatened or of special concern (National Research Council [NRC], 1996). The threat to aquatic biodiversity in North America is greater than the threat to terrestrial diversity (Naiman et al., 1995). To date, not a single aquatic species has been delisted through the Endangered Species Act procedures… An unprecedented need exists for ecological restoration of riparian ecosystems and their closely associated aquatic ecosystems." Kauffman et al., (1997) continues, "By shifting the focus to the integrity of ecological processes and functions, we are more likely to successfully attain the restoration both of habitat and species of interest." This strategy is repeated in the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan, which states: "The ACS must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian dependent species and restore currently degraded habitats (USFS and BLM, 1994)."

Recent literature acknowledges the past failures of single-species management and promotes a more holistic approach to avoid similar failures in the future (USFS and BLM, 1994; Kauffman et al., 1997; Beechie and Bolton, 1999). This holistic approach to fishery resource restoration focuses on managing physical processes that diagnose and address the cause(s) of population declines resulting from habitat degradation, instead of treating the symptoms of the degradation (e.g., NRC, 1996; Stanford et al., 1996; Kauffman et al., 1997; Poff et al., 1997; Beechie and Bolton, 1999). This type of approach applied to the restoration of salmon populations acknowledges that salmon evolved in rivers where a diverse array of habitats were maintained and recreated by dynamic long-term processes (Kauffman et al., 1997; Peterson and Reid, 1984; Benda, 1994; Abbe and Montgomery, 1996 as cited in Beechie and Bolton, 1999).

As shown in the Trinity River Flow Evaluation Study (TRFES), management must address the overall integrity of the river system by identifying physical processes that result in desired biological responses. For example, managing for flows that move, sort, cleanse, and redeposit spawning gravels provides appropriate substrate for salmon redds. The presence of appropriate substrate (in combination with other factors such as appropriate depth and velocity) provides a place for adult salmon to spawn their eggs. Gravels cleansed of fine sediment, such as sand (which is the result of scour, a physical process) allow sufficient percolation of water through the gravel to provide enough oxygen to the egg/ sac-fry for proper development, removal of waste materials, and successful emergence (i.e., fry are not trapped in gravel by fine sediment). Clean gravels increase egg-to-fry survival, improve overwintering habitat for juvenile salmonids, and increase habitat for invertebrates (prey items for fish), all of which are biological responses that result from flushing fine sediment from coarse sediment (a physical response).

Each alternative was assessed for its ability to meet thresholds of the physical processes identified in the geomorphology section of the DEIS/ EIR (Section 2.3). In addition, several biological thresholds (especially temperature associated) were also assessed for each alternative. This methodology was deemed appropriate to identify impacts to fish, wildlife, and riparian plant communities because these physical processes affect and shape the biological communities and habitats that will be present. In addition, data specific to the Trinity River mainstem and its tributaries were available for such methodology (McBain and Trush, 1997; USFWS and HVT, 1999). The types and availability of habitat determine what species and life stages will be successful. This is true for all species because all species within a community interact. While habitat can be managed for chinook fry, if that management does not provide appropriate conditions for the invertebrates that chinook fry feed upon, there will be no net increase in chinook salmon populations. The restoration of all salmonid species is much more likely when habitat and community (food web) integrity is restored (USFS and BLM, 1994; Kauffman, 1997; Beechie and Bolton, 1999).

Once habitat integrity is restored, salmonid numbers are likely to increase because of their resilience and ability to produce many young. Anadromous salmonids are highly prolific, producing 1,500-6,000 eggs per female. In biological terms, species that produce large numbers of offspring with no or relatively little parental care or energy expenditure are referred to as "r-selected" species in terms of their life history strategy. These types of species produce large numbers of eggs to assure perpetuation of the species despite years when environmental conditions are somewhat unfavorable, and have the potential to produce large

numbers of offspring when conditions are favorable. R-selected species are typically able to fully use the carrying capacity of their habitat under each individual year's conditions. Once the degraded habitat has been restored on the Trinity River, it is expected that naturally produced salmonid populations will be able to fully use these habitats, and healthy and robust populations will once again exist.

Ability of the Preferred Alternative to Meet Trinity River Restoration Program Goals

To assess the ability of the Preferred Alternative to meet TRRP goals, available inriver habitat was analyzed for the current and rehabilitated channel. This analysis investigated the habitat capacity for chinook salmon spawning, fry and juvenile rearing, and expected adult spawners in the upper 27.3 miles of the Trinity River below Lewiston Dam. This reach of the river was selected because of data compatibility of the habitat assessments conducted by the Service (USFWS & HVT, 1999) and the chinook salmon spawning distribution data collected by the California Department of Fish and Game (CDFG, 1992a; 1992b; 1994; 1995; 1996a; 1996b). General computational steps conducted for this assessment are presented in Attachment A at the end of this thematic response. However, it should be noted that it is difficult to demonstrate direct cause-effect relationships between habitat and population because of the dynamic nature of the systems involved (hydrology, climate, etc.). This analysis applies standard fish habitat techniques and measured data from the Trinity River to assess how improved habitat would benefit fish populations.

Potential Juvenile (Smolt) Production

Habitat Availability

Habitat availability estimates were obtained from PHABSIM modeling for the upper 25.7 miles of the Trinity River from Lewiston Dam to the confluence of Dutch Creek (USFWS & HVT, 1999, Table 1). Chinook salmon habitat availability data (for spawning, fry rearing, and juvenile rearing life stages) in the existing channel at a dam release of 300 cfs were used in this analysis because this is the recommended spawning and rearing flow for the Preferred Alternative (DEIS/ EIR, 1999; USFWS & HVT, 1999).

An estimate for the amount of habitat available for the Preferred Alternative was made by multiplying estimates of existing rearing habitat by 1.93. This was the factor for increased habitat measured at the Steiner Flat channel rehabilitation site following its completion (USFWS, 1997; USFWS & HVT, 1999). This assumes that increases in rearing habitat will also occur in areas adjacent to where mechanical reshaping of the channel will occur as a result of the restoration of fluvial processes. Although channel rehabilitation projects do increase spawning habitat, data to account for increases in spawning habitat are not available, so it was assumed, for this analysis, that spawning habitat would remain the same. Therefore, estimates of spawning habitat will underestimate potential redd capacity of the upper mainstem Trinity River after channel restoration activities are implemented.

Because of the differences in lengths of the river covered by the habitat availability data (25.7 miles) and the spawning escapement data (27.3 miles), the measured habitat data were

TABLE 1
Chinook Habitat Availability, Capacity, and Potential Production for the Upper Mainstem Trinity River

	Step	Existing Channel	Unit	Source	Rehabilitiated Channel	Unit	Source
a	Measured Spawning Habitat (25.7 mi)	349,986		USFWS&HVT 99			USFWS&HVT 99
b	Measured Fry Habitat (25.7 mi)	1,297,704		USFWS&HVT 99			USFWS&HVT 99
c	Measured Juvenile Habitat (25.7 mi)	4,654,342		USFWS&HVT 99			USFWS&HVT 99
d	Spawning Habitat (27.3 mi)	370,985	sq ft	= a x 1.06	370,985	sq ft	= d
e	Fry Habitat (27.3 mi)	1,375,566	sq ft	= b x 1.06	2,654,842	sq ft	= e x 1.93
f	Juvenile Habitat (27.3 mi)	4,933,603	sq ft	= c x 1.06	9,521,853	sq ft	= f x 1.93
g	Area per Redd	51	sq ft	Bartholow	51	sq ft	Bartholow
h	Fry per Redd	1,400	fry	Bartholow	1,400	fry	Bartholow
I	Fry Rearing Area	0.25	sq ft	Bartholow	0.25	sq ft	Bartholow
j	Juvenile Rearing Area	2	sq ft	Bartholow	2	sq ft	Bartholow
k	Redd Capacity	7,300	redds	= d/g	7,300	redds	= d/g
l	Potential Fry	10,220,000	fry	= k x h	10,220,000	fry	= k x h
m	Fry Capacity (Habitat)	5,502,000	fry	= e/I	10,619,000	fry	= e/I
n	Juvenile Capacity (Habitat)	2,467,000	juvenile	= f/j	4,761,000	juv	= f/j
o	Smolt Production (SRF) (Table A1)	3,158,000	smolt	= n x 1.28	6,094,000	smolt	= n x 1.28
p	Adult Spawning Escapement (Table A2)	13,000	adults	= o x 0.0041	25,000	adults	= o x 0.0041

multiplied by 1.06 (27.3/ 25.7) in order to extrapolate to the reach of the river with spawning escapement data, but no habitat availability data.

Habitat Capacity Estimates

Habitat capacity estimates were calculated by dividing the habitat availability by the area requirements for redds, fry, or juveniles (Table 1). An estimate of potential fry was calculated by multiplying the number of redds by the number of fry produced per redd.

Habitat Capacity in the Existing Channel Habitat

Based on the existing channel/ habitat conditions, the upper 27 miles of the mainstem Trinity River, at any one time during the spawning season, can support approximately 7,300 chinook redds (Table 1). While approximately 10.2 million emergent fry would be produced from this number of redds, there is only sufficient fry rearing habitat to support approximately 5.5 million fry (54 percent of the potential production) at any one time. Rearing habitat, therefore, is a limiting factor in this reach of the Trinity River. The limited availability of shallow, low-velocity habitat required by salmonid fry has been well documented (USFWS, 1994; USFWS, 1997; USFWS & HVT, 1999). Although all fry do not emerge at the same time because of the protracted spawning period for chinook salmon (mid-September to December), the current channel configuration and condition does not provide sufficient habitat to support a significant portion of the potential production. Approximately 2.5 million juvenile chinook could rear in the existing channel.

Habitat Capacity in a Rehabilitated Channel Habitat

As with the existing channel analysis, approximately 7,300 redds can be accommodated by existing spawning habitat that would result in the production of approximately 10.2 million fry (Table 1). Increases in rearing habitat, resulting from mechanical rehabilitation activities and increased flows to maintain and create additional rearing habitat, would be sufficient to support 10.6 million chinook fry (104 percent of the potential production of fry) and 4.8 million chinook juveniles.

Potential Smolt Production from a Rehabilitated Channel

The protracted emergence of salmonid fry as a result of the prolonged spawning season allows for sequential rearing of fry and juvenile salmonids. This allows rearing habitats to be “re-used” as emergent fry grow and seek deeper and higher-velocity waters as they enter more mature life stages (emergent fry - fry - juveniles - smolts). Data generated by SALMOD and juvenile habitat capacity data for the existing channel were used to account for sequential rearing and smolt production of chinook salmon (Table A1). These data suggest production would be 1.28 times greater than the static habitat capacity estimate. Using this information, approximately 6.1 million juvenile chinook would be produced in the rehabilitated channel throughout the rearing season.

Trinity River Restoration Escapement Goals—Projected Spawning Escapement/Redds and Projected Returning Spawners

Spawning Escapement with Restored Rearing Habitat

From the projected 6.1 million juvenile chinook produced from a restored channel, approximately 25,000 adults spawners would be expected to return to the 27-mile reach from Lewiston Dam to the Junction City weir, of which 24,200 (96.7 percent) would spawn in the mainstem. The spawner escapement estimate is based on the average smolt-to-spawning adult ratio (0.41 percent) for Trinity River Hatchery fingerling chinook releases (Table A2). Although this escapement level would exceed the capacity of the existing channel, increases in spawning habitat due to channel restoration activities would increase spawning habitat to an unquantified level, which would be able to accommodate additional spawners. In addition, as spawning populations increase, the distribution of spawners would change, with greater proportions spawning in downstream and tributary areas.

Trinity River Restoration Program Goals

The chinook natural spawning escapement goals of the TRRP are 62,000 fall chinook and 6,000 spring chinook (USFWS, 1983). Trinity River salmon spawner distribution data indicate that 44.2 percent of fall chinook spawn above the Junction City weir (Table A3), and 96.7 percent of the chinook that spawn above the Junction City weir spawn in the mainstem (CDFG 1992a, 1992b, 1994, 1995, 1996a, 1996b). While small numbers of spring chinook do spawn in the major tributaries of the Trinity River (South Fork, New River, Canyon Creek, North Fork), it was assumed that all spring chinook spawning occurs above the Junction City weir. Using this distribution of natural spawning escapement and the TRRP spawning escapement goals, approximately 32,300 (5,800 spring and 26,500 fall) chinook salmon would be expected to spawn in the mainstem Trinity River from Lewiston Dam to the Junction City weir. With attainment of the TRRP spring and fall chinook escapement, this number of spawners would produce approximately 16,200 redds, exceeding the current spawning capacity of 7,300 redds (Table 1).

The estimated mainstem spawner escapement based on smolt production from a restored channel geomorphology of 24,200 adults represents 75 percent of the TRRP chinook salmon spawning escapement goals for this reach of the river.

Conclusions

This analysis indicates that the projected adult spawning returns resulting from juvenile production in a rehabilitated channel would achieve 69 percent of the TRRP goals for this upper 27 miles of the Trinity River. In addition to the increase in rearing habitat addressed in this analysis, several important factors that will increase salmonid freshwater survival, and ultimately adult returns, were not accounted for. These factors include the effects of decreased sedimentation on egg/ fry survival and invertebrate production, increased smolt survival resulting from more favorable outmigration temperatures and quicker travel time during outmigration, and decreased disease mortality resulting from less favorable

conditions for pathogens. The magnitude to which these factors will potentially increase production and adult returns is unknown at this time.

The primary factor limiting chinook production in the upper Trinity River is the lack of sufficient fry and juvenile rearing habitat that resulted from habitat degradation and the change in channel geomorphology caused by the construction and operation of the Trinity River Division of the Central Valley Project (USFWS, 1994; USFWS & HVT, 1999). Increases in rearing habitat resulting from channel rehabilitation will be able to support substantially more fry and juvenile chinook salmon than can be supported by the existing habitat conditions.

In addition to increasing fry and juvenile rearing habitat, channel rehabilitation projects are expected to increase spawning habitat. Restoration and maintenance of alternate bar sequences with their associated pool-riffle sequences and the supplementation of spawning gravel will create spawning habitat the does not currently exist (USFWS & HVT, 1999; Appendix G, Plates 3 and 4). Although the magnitude of spawning habitat that will be provided by the channel rehabilitation projects has not been quantified, chinook salmon have been observed spawning on these project sites, supporting the hypothesis that these activities will provide increased spawning habitat.

This analysis focuses on chinook salmon because they have the most extensive database pertaining to life-history parameters and habitat. Channel rehabilitation and increased flows will provide diverse habitats (pool-riffle-run sequences), similar to what existed prior to the Trinity River Division. Because these were the habitats that provided the necessary habitats for all three anadromous salmon species, similar increases in habitat and population levels are expected for coho salmon and steelhead.

The interactions between biological and physical processes that affect salmonid production are extremely complex. Although it is recognized that these interactions exist, data to quantify their effects are limited. The above analysis does not account for many of the complex interactions that ultimately determine production. Its utility is to provide a general view of habitat bottlenecks, provide a general assessment of the potential of attaining restoration goals, and identify areas to focus restoration efforts.

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Attachment A. Computational Steps for Assessing Chinook Salmon Habitat Availability, Habitat Capacity, Potential Production, and Potential Adult Returns for the Preferred Alternative of the Trinity River DEIS/EIR.

Habitat Availability	Determine the habitat availability from Lewiston to the Dutch Creek confluence for spawning, fry rearing, and juvenile rearing in the existing channel at recommended dam release.
	Perform distance adjustment to make reach for the habitat data consistent with the reach for the spawning escapement data.
	Perform rearing habitat (fry and juvenile) adjustment to reflect changes in habitat availability caused by channel rehabilitation activities.
Habitat Capacity	Determine habitat capacity of the existing and rehabilitated channel by dividing the habitat availability by the density factors for each life stage.
Potential Production	Expand habitat capacity production estimate by the sequential rearing factor, which accounts for the "re-use" rearing habitats by fry and juveniles as they grow larger and use different habitats.
TRRP Spawning Escapement	Determine the proportion of Trinity River Basin fall chinook salmon that spawn in the upper Trinity River (Lewiston to Junction City weir). Assume all spring chinook in the upper Trinity River spawn above Junction City weir.
	Estimate the number of chinook that would spawn in the Trinity River above the Junction City weir if the TRRP's escapement goals were met by multiplying the proportion spawning in this reach by TRRP's goals.
Preferred Alternative Spawning Escapement	Determine projected spawning escapement for the Preferred Alternative of the Trinity River EIS/EIR by multiplying the projected juvenile (smolt) production in the upper 27 miles of the Trinity River for a rehabilitated channel by the average smolt-to-adult return ratio for Trinity River Hatchery chinook.

TABLE A1
Estimated Chinook Salmon Smolt Production (millions of fish) Generated by SALMOD Used to Calculate Sequential Rearing Factor (SRF) Resulting from Sequential Spawning/Emergence/Rearing of Salmonids for the Trinity River from Lewiston Dam to Dutch Creek (RM 25.7)

	Smolt Production[a]	Instantaneous Juvenile Capacity in Existing Channel[b]	SRF[c]
Existing Habitat with 33,000 Spawners	2.95	2.33	1.27
Existing Habitat with 68,000 Spawners	2.98	2.33	1.28
Average			1.28

[A] Data source: USFWS & HVT, 1999; Table 5.23, weighted average by water-year class.
[B] Instantaneous habitat capacity based on PHABSIM data (USFWS & HVT, 1999).
[c] SRF calculated by dividing smolt production by instantaneous juvenile capacity

TABLE A2
Trinity River Hatchery Fall Chinook Fingerling CWT Release and Recovery Data, and Adult Spawner Return Ratio (KRTAT Cohort Reconstruction, 1999)

Brood Year	No. Released	No. Spawning Adult Returns[a]	Spawner Return Ratio (percent)
83	182,178	1,280	0.70
84	178,016	1,273	0.72
85	186,598	1,752	0.94
86	198,722	70	0.04
87	157,227	63	0.04
88	190,574	79	0.04
89	184,549	18	0.01
91	203,622	657	0.32
92	169,981	2,003	1.18
93	199,789	132	0.07
Average			0.41

[a] Number of spawning adult returns includes CWTs recovered at TRH and estimated numbers spawning in the mainstem Trinity River.

TABLE A3
Numbers of Trinity River Fall Chinook Spawning in the Trinity River above the Willow Creek Weir (WCW) and Junction City Weir (JCW) [a]

Return Year	1989	1990	1991	1992	1993	1994	Average
No. Above WCW	29,445	7,682	4,867	7,139	5,898	10,906	
No. Above JCW	16,346	2,931	4,088	3,148	2,742	4,012	
Proportion above JCW	0.5551	0.3815	0.8399	0.4410	0.4649	0.3679	0.442 [b]

[a] Data Sources: (CDFG, 1992a, 1992b, 1994, 1995, 1996a, 1996b).

[b] Average was calculated excluding 1991 because of the skewed spawning distribution during that year.

Alternatives Recommended by Commentors: Additional Mechanical Restoration and Alternative Flow Schedules

Many reviewers took issue with the range of alternatives that use flows for fishery restoration. Others took issue with the amount of mechanical restoration proposed and suggested that more mechanical restoration should be recommended, usually with a corresponding decrease in instream releases. The majority of commentors requested that flow releases be increased to at least 70 percent of unimpaired flow. It is assumed that these commentors based their assertion on the "Tennant Method," a shorthand approximation for determining optimum flow releases. These commentors typically stated "I support … flow regime which allows the Trinity River to keep at least 70 percent of its flow" or "I support a diversion of no more than 30 percent of the natural water flow from the Trinity River Basin." Although many of these comments stated that "science has determined that a river system needs 70 percent of its yield to remain healthy," they provided no supporting information or scientific rationale, although some commentors specifically mentioned the Tennant Method.

While the Tennant Method is an appropriate "first generation" analysis for setting interim flow standards when data are sparse, this method is not appropriate for establishing flow recommendations for the Trinity River for which a site-specific flow study was conducted to determine appropriate activities, including flow levels necessary to restore and protect fishery resources. Also see thematic response titled "The Basis for Fisheries Analyses Performed in the DEIS/EIR."

Some commentors suggested that harvest management or greater mechanical manipulation would be appropriate to restore fisheries and reduce the flow necessary in the Trinity River. Two "non-flow" alternatives considered in the DEIS/EIR were the Harvest Management and Mechanical Restoration Alternatives. Harvest management was considered but rejected as a potential alternative as discussed in the DEIS/EIR (see page 2-38). A major focus of the DEIS/EIR was flow and mechanical habitat restoration because many of the other factors that influence salmonid populations are already addressed by other natural resource management processes and/or agencies (Forest Plan process, Total Maximum Daily Load (TMDL) process, Pacific Fisheries Management Council (PFMC), Klamath Fisheries Management Council (KFMC), U.S. Bureau of Land Management (BLM), U.S. Forest Service (USFS). The fully analyzed Mechanical Restoration Alternative would hold existing instream flows and water exports constant.

The Mechanical Restoration Alternative comprised the No Action flow schedule (2,000-cfs peak flow and 340 taf/yr, or approximately 35 percent of the annual water volume entering Trinity Reservoir) and called for construction of 47 rehabilitation sites, which would then be maintained mechanically (Section 2.1.6, page 2-26 of the DEIS/EIR). Existing and additional watershed restoration actions (generally considered mechanical), such as continuing

Hamilton Ponds operations, were also recommended. In contrast, the Maximum Flow Alternative advocates a rehabilitated channel created by a 30,000-cfs peak flow in extremely wet years to remove the riparian berm with channel maintenance by flows alone. The Mechanical Restoration Alternative continues the current level of diversions to the Central Valley, whereas the Maximum Flow Alternative eliminates virtually all diversions to the Central Valley.

Forty-seven potential rehabilitation sites are identified (see revised Figure 2-4 in Section 2.3 of the FEIS/EIR) for mechanical restoration along the mainstem Trinity River. These sites are included in all alternatives that identify mechanical restoration as a component, whether or not these sites are subsequently maintained mechanically or by flows. All potential channel rehabilitation sites have been identified in the section of the Trinity River from Lewiston Dam to the confluence with the North Fork Trinity River, so there is no opportunity to construct more channel rehabilitation projects as several commentors asserted.

While some mechanical actions can improve local stream channel complexity (as identified and recommended in the Preferred Alternative), these efforts alone are temporary in nature and cannot duplicate the processes that occur with additional flow. High flows are necessary to create deeper pools, establish riffle: pool sequences, scour undercut banks, clean gravels, diversify particle size distributions, and regenerate floodplain riparian vegetation in a more proper form and function throughout the mainstem. Mechanical restoration without consideration of the physical and ecological processes can be costly to maintain or fail outright (Frissel and Nawa, 1992; Kauffman et al., 1997 as cited by Beechie and Bolton, 1999). The Mechanical Restoration Alternative may re-shape localized channel segments that initially appear in an alluvial river, but these segments would require perpetual maintenance and frequent reconstruction. Additionally, floodplain maintenance would not occur at all in areas other than channel rehabilitation sites if flow is not increased.

The Mechanical Restoration Alternative does not prescribe geomorphic thresholds vital to creating and sustaining alluvial river geomorphology. Recommended peak flows not to exceed 2,000 cfs cannot mobilize the general channel bed or spawning gravel deposits, will not redistribute fine bed material to rebuild floodplains, will eliminate groundwater recharge of the floodplain and channel corridor, and cannot route coarse sediment contributed from tributaries. Alternating bars would not be formed, then periodically reshaped; and riparian vegetation would rapidly encroach on all contemporary alluvial features. Mechanical actions cannot reproduce or sustain these alluvial prerequisites to a healthy river. Natural processes mediated by variable flows are essential for restoring river ecosystems (Ligon et al., 1995; Stanford, 1996), and this same perspective is adopted in the Preferred Alternative.

The mainstem has continued degrading since construction of the dams. The Mechanical Restoration Alternative will not reverse this trend, but only provide relief at selected locations. As riverine habitats continue to degrade, more riverine-dependent species will likely decline, making additional Endangered Species Act (ESA) listings possible. Such listings make continued mechanical manipulations more restrictive and expensive as the number of permits and additional surveys increases to ensure ESA-listed species are not adversely affected. Restoration of the physical processes and associated riverine habitats will likely prevent future ESA listings and will help recover species currently listed.

The Sacramento Municipal Utility District (SMUD) provided comments that recommended additional mechanical manipulations and alternative flow schedules (see SMUD Comment Letter 5311). The alternative recommended by SMUD would decrease instream release volumes from those recommended by the Preferred Alternative of the DEIS/EIR while "Supplementing increased peak flows with non-flow habitat restoration techniques, including mechanical removal of tributary sediment bars and dredging…" Instream release volumes for this alternative range from 340 taf to 528 taf, averaging 423 taf, compared to the recommended release volumes of the Preferred Alternative, which range from 369 to 815 taf, and average 595 taf.

Many of the flow decreases recommended by SMUD would not meet biological objectives necessary for the recovery of the fishery resources of the Trinity River. With decreased peaks and durations as recommended by SMUD, many desired geomorphic processes would not occur, especially if the peak is capped at 6,000 cfs. While this 6,000 cfs "cap" does limit gravel loss in the reach below the dam (which can be corrected by coarse sediment augmentation), it greatly limits or prevents some physical processes from occurring (Table 8.2 in the TRFES).

SMUD states that their alternative would "reduce impacts to the power, water, and Central Valley fisheries by more than 50%," but they do not provide any fisheries information or water resources information to support their statement, only data on power impacts. SMUD also states that their phased implementation "would rely on data (rather than speculation associated with the preferred alternative) to determine flow levels." The flow levels identified in the Preferred Alternative (TRFES) are based on current data and are designed to meet specific objectives. SMUD does not present any information refuting these objectives.

Many of the same functions that would be lacking in the Mechanical Restoration Alternative (listed above) would also be lacking in the SMUD proposal due to decreased flows. In addition to the lack of positive functions under this alternative, there would be continual negative impacts from ongoing mechanical maintenance. These negative impacts are reiterated in comments received from the California Department of Fish and Game (CDFG). CDFG states, "The department opposes the Mechanical Alternative because the minor benefits provided to the fishery of the Trinity River do not out weigh the perpetual impacts to riparian habitat." CDFG states that the continual disturbance of sites "will preclude providing suitable habitat for self-sustaining populations of amphibians, birds and mammals" (see CDFG Comment Letter 6314, page 5, Section C). These perpetual impacts to riparian habitat and species would also occur under the SMUD alternative due to the need for continual mechanical maintenance (also see specific comments to the SMUD alternative, Comment Letter 5311).

When the SMUD alternative was evaluated using the Trinity River System Attribute Analysis Method (TRSAAM), as all other alternatives were, the proposal resulted in a score of 0.47 (35 of 74 possible) (see page 3-170 of the DEIS/EIR for a description of TRSAAM). This compares poorly to scores of 0.66 for the Preferred Alternative and 0.81 for the Maximum Flow Alternative. This is likely an overly optimistic evaluation of the SMUD proposal because high scores were given some of the attributes/objectives for mechanical maintenance approaches (e.g., removal of 2-year-old seedlings), but this approach ignores

many of the detrimental effects of continued disturbance of the riparian/aquatic environment (see specific responses to the SMUD Comment Letter 5311 for further description).

For those reviewers who only focused on impacts within the Central Valley, it is important to note that implementation of the Mechanical Restoration Alternative would result in some significant ongoing, permanent impacts related to water quality, and potentially some disruption of riparian habitats, depending on the frequency of mechanical maintenance, in the Trinity River Basin (see comments provided by CDFG pertaining to the Mechanical Restoration Alternative, Comment Letter 6314). The lead agencies believe that the alternatives discussed in detail in the DEIS/EIR are adequate, provide a reasonable range of options, and did not rely too heavily on increased flows as a means of improving the Trinity River fisheries.

Over a period of years, and based on very detailed and lengthy scientific studies, the expert scientists working for the lead agencies determined that increased flows are essential to improving fishery resources and are more effective than non-flow means. To the extent that increased flows in the Trinity River require environmental or economic tradeoffs in the Central Valley, the Secretary of the Interior (Secretary) will take such tradeoffs into account when making policy decisions regarding restoration of the Trinity River's fishery resources. The decision as to how to balance various tradeoffs is properly made by the Secretary, who is entitled to an environmental document that provides a range of alternatives best calculated to meet the purpose and need of the project. The DEIS/EIR fulfills that function. It provides a whole range of fully developed alternatives, as well as discussions of why certain other alternatives were not addressed in the same level of detail.

Also see thematic response titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives."

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Increasing Effectiveness of Releases by Accounting for Storm Flows

Several reviewers stated that winter flood flows and safety-of-dam releases should be used to achieve fluvial geomorphic objectives and the corresponding spring releases be accordingly reduced.

Releasing high flows from the Trinity River Division (TRD) to augment high flows provided by tributaries downstream of Lewiston Dam falls into three classes:

1. **Piggy-backing floods**: These releases would be intentionally timed to coincide with downstream tributary flood peaks. To time dam releases with tributary flood peaks would require a predictive model(s) on expected tributary flood peaks generated by incoming storm systems. Piggy-backing dam releases would need to occur between November and March to coincide with rainfall and rain-on-snow storm events in tributaries downstream of Lewiston Dam.

2. **Percent inflow releases**: These releases would be based solely on a percentage of the rate of inflow into Trinity Reservoir. The 40 percent alternative in the Trinity River DEIS/EIR is based on releasing a 40 percent average of the previous 7-day's inflows, generating a stair-step release pattern with a 7-day frequency. The highest inflows into the TRD (and the correspondingly largest releases into the Trinity River) would occur between November and March to coincide with rainfall and rain-on-snow storm events in the watershed upstream of the TRD. The success of timing dam releases with downstream tributary flood peaks would depend on the length of averaging (7-day versus 3-day versus 1-day) TRD inflows; the longer the averaging period, the longer the lag-time between storm event and dam release, thus the lesser benefit to downstream flow augmentation. In other words, the longer the averaging period, the less chance there would be to piggyback on tributary floods. Therefore, a shorter averaging period would generate larger dam releases, as well as greater piggy-backing benefits.

3. **Safety-of-Dams releases**: These flow releases are in response to Safety-of-Dams (SOD) release criteria from Trinity Dam, and have typically occurred during January and February in wetter water years. The SOD releases have typically been 6,000 cfs, but were as high as 14,500 cfs in 1974. These flow releases are in response to SOD release criteria, and would not be scheduled for restoration purposes.

While the timing of high flows in winter is a natural event (as evidenced from unimpaired Trinity River at Lewiston streamflow hydrographs), releasing flows in the magnitude needed to achieve geomorphic and riparian objectives (6,000 to 11,000 cfs) since development of the TRD would most likely result in significant scour mortality of that year's cohort of incubating chinook and coho salmon eggs. This would be particularly true in reaches where channel geomorphology has not been rehabilitated (i.e., riparian berm removal and floodplain formation) because (1) the berm forces many of the redds to be constructed in the center of the channel, and (2) the riparian berm focuses scouring forces

between the riparian berms. Detailed hydraulic measurements at un-rehabilitated sites (Wilcock et al., 1995) and rehabilitated sites (McBain and Trush, 1997) have shown that rehabilitation greatly moderates scouring forces and distributes those forces more equally across the channel. Until the channel rehabilitation program is completed and a more thorough evaluation of chinook and coho salmon spawning patterns and scour potential is completed, the risk of release-induced losses to chinook and coho salmon production precludes recommending high flows during this period and would be contrary to the take prohibitions of ESA-listed coho salmon. This is explicitly recommended as part of the Adaptive Environmental Assessment and Management (AEAM) program, as discussed in Appendix O of the TRFES:

"No high-flow releases are planned [for the fall/winter storm hydrograph], but synchronization of peak releases with stormflows should be evaluated through the adaptive management program to assess opportunities to maximize benefits of high-flow releases while conserving water."

Evaluation of piggy-backing releases and the percent inflow releases cannot be conducted until the AEAM program is developed, channel rehabilitation projects are implemented, and as our understanding of discharge/redd scour improves. This knowledge will allow us to better predict the potential negative impacts of winter high flows on chinook and coho salmon cohort production.

There have been suggestions that when SOD releases occur, spring high flows should be decreased because the SOD flow would have potentially achieved physical objectives for that water year. The concept of SOD releases receiving some sort of "ecological credit" was carefully considered in development of the Trinity River Flow Evaluation recommendations/Preferred Alternative. Flow recommendations of the Preferred Alternative are based on quantitative management objectives, including flow magnitude, flow duration, and timing. Therefore, the ecological benefit of an SOD release of 11,000 cfs for 10 days in December does not equal the ecological benefit of a 10-day 11,000-cfs release during the spring snowmelt period. For example, if an 11,000-cfs SOD release occurs in January of an extremely wet water year, achieving bed mobility, bed scour, and sediment transport objectives for that year, the magnitude and duration of the spring release could be reduced from the 5-day 11,000-cfs release. However, spring biological objectives, such as meeting smolt temperature criteria and preventing riparian seedling germination low on alternate bar surfaces, would still require some portion of the snowmelt runoff hydrograph.

SOD releases from Trinity Dam have occurred in 8 of 35 years (see Appendix F of the TRFES), but these releases have not been of significant magnitude or frequency to achieve many of the fluvial restoration objectives needed to restore or maintain the mainstem habitat. Under the Preferred Alternative, the frequency of SOD releases will decrease by 36 percent compared to No Action, primarily because of lower end-of-year reservoir storage levels (see Appendix A of the DEIS/EIR). Therefore, the insufficient magnitude of SOD releases and expected low frequency may only provide limited ecological benefits in the future.

Further consideration of the potential benefits of SOD releases must only be considered based on sound scientific information and within a science-based AEAM program.

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Comparison of Population Trends in Unregulated Rivers (Smith River and South Fork Trinity River) and the Mainstem Trinity

Several reviewers stated that the declines of Trinity River salmonid populations are not due to the construction and operation of the Trinity River Division (TRD). They stated that salmonid populations in the Pacific northwest generally have declined, and the TRD is not the cause of the current low populations of Trinity River salmonids. Commentors also asserted that salmonid populations in the Smith River, California, have also dramatically declined, and this is a watershed that is fairly intact and does not have any dams on it. They also stated that the same is true for the South Fork Trinity River populations.

Empirical evidence does not support the idea that the dams on the Trinity River bear little responsibility for decline of the anadromous fishery. Within 10 years after the completion of the TRD, the negative effect of these dams and their operation on the salmonid resources of the TRD was recognized (Hubbell, 1973; Trinity River Basin Fish and Wildlife Task Force, 1977). Land management activities, dam construction and operation, and harvest were identified as the three primary factors that have caused declines in anadromous salmonid populations in the Trinity River (USFWS, 1980). Measures have been initiated or taken to address the watershed and fish harvest factors, but the operations of the TRD have yet to be addressed. The Trinity River Basin Fish and Wildlife Restoration Program initiated many watershed restoration activities, especially in Grass Valley Creek. In addition, since the early 1980s, the fisheries that harvest Trinity River Basin salmon and steelhead have been intensively managed and regulated.

No pre-TRD data exist to compare population trends between the Trinity River and the Smith River or South Fork Trinity River. If escapement data for the Smith River and the Trinity River displayed the same trends (i.e., the data were correlated), then the assertion made by the commentors that the dam was not the primary cause for the salmonid population decline on the Trinity River may have some validity, but this assertion is not supported by the available data. Using hatchery-return data as a surrogate for natural populations, the commentors' assertion that the Smith River populations, unaffected by a dam, have experienced similar declines is unfounded. Concerning the decline of salmonid populations in the South Fork Trinity River, these declines have been attributed to habitat degradation resulting from poor land management activities and have also been affected by TRD operations to the extent that these operations have negatively influenced mainstem temperature regimes.

Smith River

Salmonid populations experience large variations in population size due to a variety of natural and human-induced factors. Natural factors include freshwater habitat conditions caused by floods and drought and oceanic conditions. Human-induced factors include

water diversions, watershed disturbances, instream habitat disturbances, and harvest (Pearcy, 1992; Bisson et al., 1997). Salmonids exhibit varied life-history patterns and are relatively fecund (r-selected species), so that when conditions are favorable they experience large population growth, and when environmental conditions are unfavorable they experience population suppression.

If oceanic conditions were the primary reason for the decline in salmonids populations, then it would be expected that the abundance of hatchery populations would show similar trends. As long as the watersheds where the hatcheries were located were fairly close and the stocks had similar oceanic distribution, the stocks from different watersheds would be exposed to similar oceanic conditions, and the influence of variable freshwater environmental conditions would be minimized because of stable rearing habitat provided by the hatcheries.

Rowdy Creek Hatchery (RCH) is located on a tributary to the Smith River, and Trinity River Hatchery (TRH) is located below Lewiston Dam. To evaluate if Smith River populations and Trinity River populations were experiencing similar declines in population, a comparison of hatchery fall chinook returns was conducted, using returns to Rowdy Creek Hatchery and Trinity River Hatchery-produced fish. Comparable escapement data only exists for the period from 1982 through 1995, so comparisons of long-term population trends, especially prior to the construction of the Trinity River Division, is impossible.

Although data are limited, the statistical analysis of the relationship between fall chinook populations from Rowdy Creek Hatchery on the Smith River and Trinity River Hatchery indicates that the trends in spawning escapement are not related (the correlation between spawning escapements is poor and not statistically significant [$r = -0.042$, $p=0.886$]) (Figure 1). If escapement data for the Smith River and the Trinity River displayed the same trends (i.e., the data were correlated), then the assertion made by the commentors that the dam was not the primary cause for the salmonid population decline on the Trinity River may have some validity; but this assertion is not supported by the available data.

South Fork Trinity River

While there are no dams or large diversions on the South Fork Trinity River, declines have occurred in some fish populations in this basin. The South Fork watershed has undergone substantial impacts due to past and continuing land management practices. The South Fork Trinity River is listed as an impaired water body by the U.S. Environmental Protection Agency (EPA) because of excessive sediment input.

Species of concern in the South Fork Trinity River include spring and fall chinook, summer and winter steelhead and coho salmon, and Pacific lamprey. Historic documentation of these stocks is limited; however, there is some information from the early 1960s and anecdotal accounts that give some idea of the declines that these stocks have undergone in the past several years.

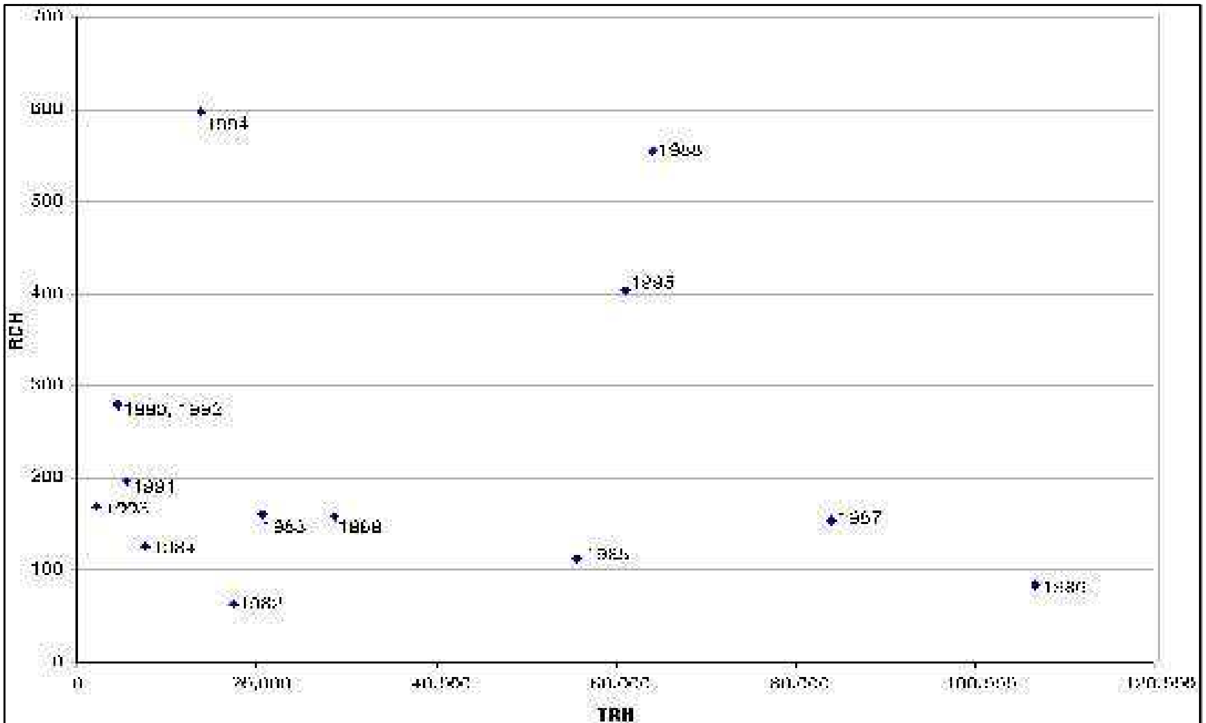

FIGURE 1
ROWDY CREEK HATCHERY (RCH) FALL CHINOOK SPAWNING RETURNS AND TRINITY RIVER HATCHERY (TRH) PRODUCED FALL CHINOOK SPAWNING RETURNS, 1982-1995
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

Chinook

Data exists that indicate that spring chinook populations have declined greatly since the early 1960s. California Department of Fish and Game (CDFG) surveys estimated a population in 1963 between 7,000 and 10,000 (Healey, 1963 as cited in PWA, 1994) and a 1964 population of 11,600 (LaFaunce, 1967) in the upper South Fork. Fall chinook numbers have ranged from 3,300 (including jacks) in 1964 (LaFaunce, 1967) to a low of 345 fish in 1990 (PWA Table 2-2, 1994). As recently as 1997, the fall chinook estimate was 1,210 fish based on CDFG helicopter redd surveys of the lower river (CDFG, 1998).

Steelhead

As reported by Pacific Watershed Associates (PWA), there are indications that summer steelhead may never have been abundant in the South Fork. However, reported numbers are extremely low. Population data are very limited for winter steelhead, although it is assumed that their numbers have declined based on angler interviews and anecdotal information from citizens living in the South Fork basin (PWA, 1994). The CDFG estimated that there were 2,326 winter steelhead in 1991 and 3,500 in 1992 in the South Fork (CDFG as cited in PWA, 1994).

Coho

As with steelhead, very little data exist for coho salmon in the South Fork, although anecdotal reports site coho adults in tributaries near Hyampom. Stream surveys from 1952 (Coots, 1952 as cited in PWA, 1994) indicate juvenile coho salmon were present in tributar-

ies. Though historical population information is not available for comparison to current estimates, current numbers are considered extremely low (PWA, 1994).

Pacific Lamprey

Population data for lamprey are non-existent. There are accounts from residents that lamprey runs would occur in the Hyampom area during spring, and adults would die in early summer (PWA, 1994). It may be assumed that factors that have resulted in declines of other anadromous runs have likely contributed to declines in lamprey populations because there is some overlap in habitat use with salmonids, particularly by spawning adults.

Summary: South Fork Trinity River

There is evidence that other anthropogenic impacts to the South Fork basin have contributed to the declines of most fish runs. The geology of much of the mainstem South Fork watershed is highly unstable, and much of the basin is susceptible to extensive erosion. Clear-cut logging followed by the flood of 1964 contributed vast amounts of sediment into the mainstem South Fork and several tributaries. In some locations, up to 24 feet of sedimentation occurred during the flood (PWA, 1994).

The EPA reported that the dominant process of sediment delivery to the basin is mass wasting (landslides and debris flow) and that most landslide activity during the period 1944-1990 occurred between 1960 and 1975 (EPA, 1998). This report also states that road-related sediment delivery has continued to increase from 1944 to the present.

PWA (1994) reported that there appears to be an inverse relationship between the amount of sand and fine sediment in pools and the density of juvenile salmonids in many South Fork sub-basins. They suggest habitat in the basin is one factor limiting salmonid production and that long-term sediment control will be an important component of fish population recovery.

Pool volume was the physical parameter most closely related to spring chinook densities according to Barnhart and Hillemeier (1994). They reported that pool volume did not appear to be limiting spring chinook populations during 1992 and 1993 surveys. However, they did conclude that holding habitat could be limiting if a large spring chinook run occurs during a low water year.

Although there are no dams on the South Fork, it is evident that other disturbances to fish habitat have contributed to declines in numbers. One of the main components of the Trinity River Restoration Program has been an effort to reduce erosion in tributary basins that contribute high amounts of fine sediment to the mainstem Trinity River. Without these efforts and appropriate land management practices in the future, success of habitat and fishery restoration efforts would be limited.

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Role of the Trinity River Hatchery

Several reviewers provided comments pertaining to the operation of Trinity River Hatchery (TRH), its potential role in increasing salmonid populations, the impacts of hatchery-produced fish on naturally produced fish, and implementation of hatch-box programs. The purpose of TRH is to mitigate for the loss of salmonid production from habitats upstream of Trinity Dam. Additionally, Section 2(a)(1)(c) of the 1984 Trinity River Basin Fish and Wildlife Management Act (P.L. 98-541), as amended by P.L. 104-143, states that Trinity River Hatchery is not to impair "efforts to restore and maintain naturally reproducing anadromous fish stocks within the Basin." Increased hatchery production was identified during public scoping as a potential alternative to meet the purpose and need to restore and maintain natural production downstream of Lewiston Dam. However, increased hatchery production does not do this because by definition, hatchery fish are not naturally produced (see Section 2.2.6, page 2-41 of the DEIS/EIR).

The DEIS/EIR states that "naturally producing populations are self-sustaining" (see page 3-158 of the DEIS/EIR). Increasing hatchery production to increase the numbers of spawners does not create a naturally producing population that is self-sustaining, but creates a "put and take" fishery. The TRH itself has mitigation goals for each of the three salmonid species, but these goals are different from the inriver spawner escapement goals for naturally produced salmonids as developed by the Trinity River Restoration Program (TRRP). Hatchery-produced fish (the F-1 generation) that opt to spawn in the river instead of returning to the hatchery are not considered naturally produced (they were produced at the hatchery) and do not contribute to the TRRP's inriver spawner escapement goals. However, if their offspring survive (the F-2 generation) from eggs in the river to adult, this F-2 generation is considered naturally produced and do contribute to the TRRP's inriver goals (see pages 3-157 and 3-158 of the DEIS/EIR for an explanation of the TRRP goals for both inriver escapement and hatchery return and definition of terms used in relation to hatchery- and naturally produced fish). The F-2 generation will not significantly increase the number of spawners in subsequent years because habitat for fry has been found most limiting.

The DEIS/EIR discusses potential adverse effects of hatchery operations on natural production and suggests approaches to eliminate or minimize any adverse effects (see Appendix B, page B-8 of the DEIS/EIR). The available information that includes the numbers of hatchery fish spawning inriver and therefore competing with naturally produced fish is disclosed (see pages 3-158 to 3-160 of the DEIS/EIR; Appendix B, Attachment B1, Tables B1-2, B1-3, B1-4, and B1-5). At this time, there is insufficient information specific to the genetics of hatchery/naturally produced interactions of Trinity River salmonids to effectively evaluate the potential problem. These actions were not ignored, but acknowledged, and kept constant across all alternatives for impact analysis. Recent changes in TRH guidelines (1996) have been adopted to reduce/minimize potential negative impacts. These new guidelines have not been implemented for a sufficient time to be thoroughly evaluated. Fry and juvenile rearing habitat has been identified as greatly limiting the restoration of naturally produced fish. Hence, an informed decision to restore salmonid habitat by implementing

the Preferred Alternative and continuing to evaluate the hatchery operations through the Adaptive Environmental Assessment and Management (AEAM) plan is a prudent and rational approach to restoring the natural salmonid production in the Trinity River.

Relocation of TRH to reduce any potential negative impacts of hatchery fish on naturally produced fish was not identified in the initial public scoping for the DEIS/EIR, and was not an alternative considered in the DEIS/EIR. Presently, the effects of hatchery-produced fish on naturally produced fish are not well understood within the Trinity River system. While hatchery fish spawning inriver has been identified as a potential problem in years with large numbers of adults returning to the river, the hatchery has recently adopted (1996) new operational guidelines to reduce such impacts. These new guidelines include (1) accepting all adults into the hatchery, (2) not exceeding hatchery production goals, and (3) releasing hatchery smolts at a time that minimizes their competition with naturally produced smolts. Changes in hatchery operations are likely to reduce any impacts to naturally produced fish without the additional expense of relocating the hatchery. Relocation of TRH will not increase habitat and will not improve the spawning success in the 40 miles below Lewiston if habitat degradation is not reversed. The channel will continue to be channelized, coarse sediment (including spawning gravels) will not be available, redd scour is likely to continue with the current channel configuration, and fry habitat will still be largely limited.

Hatch-box programs to increase salmonid production would not increase natural production and would create a situation where naturally produced fry would be competing with hatch-box fry for very limited fry rearing habitat. This would not be an increase in natural production as identified in the purpose and need, and defined in recent legislative mandates Central Valley Project Improvement Act. These types of activities also do not address the root of the problem, which is degraded freshwater habitat (BLM, 1995; USFWS and HVT, 1999). Hatch-box facilities can be beneficial as a short-term solution when spawning habitats or spawners are limited. However, the best available data and information indicates that salmonid rearing habitat is much more limiting than spawning habitat (Section 5.6 in the TRFES). Increasing fry production without increasing corresponding inriver habitat carrying capacity and addressing factors that degrade rearing habitat will not increase natural production in the mainstem Trinity River.

Some reviewers requested that additional information be made available, specifically the numbers of hatchery fish spawning inriver. Available information can be found in Appendix B, Attachment B1, Tables B1-2, B1-3, B1-4, and B1-5 for spring chinook salmon, fall chinook salmon, coho salmon, and steelhead from 1983 to 1997, although data is not available in all years for all species. Trends for numbers of hatchery fish to naturally produced fish spawning inriver are discussed in the DEIS/EIR (see pages 3-158 to 3-160 of the DEIS/EIR) and diagramed for fall chinook, which has the most complete data set (see Figure 3-36 of the DEIS/EIR).

References

BLM. 1995. Mainstem Trinity River Watershed Analysis. U.S. Department of the Interior, Bureau of Land Management, Redding Resource Area, Redding, CA.

USFWS & HVT (U.S. Fish and Wildlife Service and Hoopa Valley Tribe). 1999. Trinity River Flow Evaluation Final Report; June 1999. Arcata, CA.

Predator Control as a Means for Increasing Population

Some reviewers commented that salmon production is limited by predation, and some reviewers specifically called for an alternative that would reduce sea lion and seal populations to increase salmon returns. While these marine mammals, as well as other animals, are known to prey on various life stages of salmon and steelhead, the best available science indicates that freshwater habitat is largely limiting the production potential in the Trinity River (BLM, 1995; USFWS and HVT, 1999). A predator-control alternative approaches the problem of salmon production in the same manner as the Harvest Management Alternative, but while the Harvest Management Alternative proposed to reduce salmon mortality through the implementation of increased harvest restrictions, a Predator Control Alternative would decrease salmon mortality by decreasing predator populations.

Analysis of the Harvest Management Alternative showed that reducing harvest to meet escapement goals did not increase salmonid production (see Sections 2.2.2 and 2.2.5, pages 2-38 through 2-40 of the DEIS/EIR; and Appendix B, Attachment B15) because it did not address freshwater habitat limitations. A Predator Control Alternative would be ineffective for the same reasons and was also eliminated from consideration (see Section 2.2.5, page 2-40 of the DEIS/EIR). Reducing salmon mortality by decreasing predator populations, such as sea lions and seals, will not address the habitat conditions that limit salmonid production in the Trinity River and would also raise Marine Mammal Protection Act issues.

References

BLM. 1995. Mainstem Trinity River Watershed Analysis. U.S. Department of the Interior, Bureau of Land Management, Redding Resource Area, Redding, CA.

USFWS & HVT (U.S. Fish and Wildlife Service and Hoopa Valley Tribe). 1999. Trinity River Flow Evaluation Final Report; June 1999. Arcata, CA.

Analysis Methods for Central Valley and Delta Fishery Resources

Some reviewers questioned the use of particular models, as well as methodology used to identify potential impacts to Central Valley and Delta fisheries related to reduced Trinity exports. To assess and distinguish the effects of the proposed alternative on the fishery resources within the Central Valley and Delta within the context of the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) analysis, it was necessary to identify a set of methods that were reasonable and effective for a large geographic area and a diverse fishery resource. As summarized in the DEIS/EIR (Section 3, page 3-172 for anadromous and page 3-181 for native and non-native fishes), the methods used to evaluate and assess alternatives included Reclamation's Sacramento River Salmon Mortality Model (LSALMON2) and changes in flows into the Sacramento River and the Sacramento/San Joaquin Delta (Delta). A detailed description of the methods for impact analysis regarding the diverse set of fishery resources in the Central Valley are in Appendix B, Fishery Resources of the DEIS/EIR (page B-36 for anadromous salmonids; page B-65 for other native anadromous fishes; page B-79 for resident native fishes; and page B-93 for non-native fishes). Also see the thematic response titled "Use of Water Delivery and Related Models."

It is important to note that the analysis conducted and presented in the DEIS/EIR represented a "worst-case" analysis, in that **any** identified negative change with regard to water quality, temperature, or mortality (given the particular indicator used for each model) was identified as a potentially significant impact. Because at the time the DEIS/EIR was released for public review the results of the completion of necessary ESA consultation were not yet known, the DEIS/EIR conservatively identified such impacts as "unavoidable" in Chapter 4 Other Impacts and Commitments. Since the issuance of the Public DEIS/EIR, ESA consultation has been completed and biological opinions finalized (under separate cover). Implementation of the Preferred Alternative is not likely to jeopardize delta smelt, Sacramento splittail, bald eagle, and northern spotted owl (per the U.S. Fish and Wildlife Service's [Service] Biological Opinion [BO]) or Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and Southern Oregon/Northern California Coast coho salmon (per the National Marine Fisheries Service's [NMFS] BO) given the implementation of reasonable and prudent measures specified in each BO and listed in the thematic response titled "Mitigation to Listed Species/ESA Consultation."

In recent years, the primary and established tool for evaluating the effects of water projects on anadromous salmonids in the Central Valley has been the LSALMON2 model. This model has been used for many years as the primary evaluative tool to assess impacts of water projects within the mainstem Sacramento River. The Biological Assessment of long-term effects of the Central Valley Project Operations Criteria and Plan (CVP-OCAP) and the subsequent Biological Opinion issued by NMFS (1993) relied on the LSALMON2 model to evaluate CVP project impacts.

As discussed in the DEIS/EIR, the LSALMON2 model was used to estimate the projected losses of the egg and fry life stages of chinook salmon in the uppermost portion of the Sacramento River. This is where and when eggs and fry are most vulnerable (U.S. Bureau of Reclamation [Reclamation], 1991). As shown in Table 3-15 of the DEIS/EIR, the model estimated that for the implementation of the Maximum Flow, Flow Evaluation, or the Percent Flow Alternative, some species of chinook salmon would be potentially affected by increased water temperatures. This approach is consistent with the NMFS' approach to management and focus on water temperatures. Lacking established habitat-flow relations to evaluate the impacts of the DEIS/EIR's alternatives on other non-salmonid anadromous species such as sturgeon, it was necessary to identify and employ an alternative assessment methodology. Reclamation's PROSIM model was used given its accepted use as a modeling tool (see the thematic response titled "Use of Water Delivery and Related Models"). The data are limited in their ability to precisely assess impacts to fishery resources given a monthly time-step is used to estimate the volume of water at discrete locations along the Sacramento River (e.g., Keswick, Grimes, and Verona) and the Delta (inflow and outflows). Given this limitation, the CEQA/NEPA impact assessment evaluations examined the differences in the magnitudes of monthly streamflows within the Sacramento River at those discrete locations. This approach resulted in identifying specific months and locations where an alternative differed from the No Action Alternative by more than 10 percent. The primary and underlying assumption was that a streamflow reduction of greater than 10 percent at a particular location along the Sacramento River and inflows and outflows in the Delta, as compared to the No Action Alternative, would be sufficient to reduce habitat quantity and/or quality to an extent that would significantly affect fish species. This assumption was very conservative. It is likely that reductions in streamflows much greater than 10 percent would be necessary to significantly (and quantifiably) reduce habitat quality and quantity to an extent detrimental to fishery resources.

For other native fishery resources occupying the lower Sacramento River and the Delta, a methodology similar to that for the non-salmonid anadromous species in the Sacramento River was employed. The changes in monthly streamflows within the Sacramento River for each alternative were compared to the No Action Alternative. For an assessment of impacts of each alternative to native fishery resources in the Delta, inflows and outflows to the Delta, the ratio of Delta inflow to export flows, and the physical position of X2 (the location of water with a concentration of two parts-per-thousand [ppt] in the Bay-Delta estuary) within the Delta compared to the No Action Alternative, see page B-79 in Appendix B.

Finally, to evaluate the impacts of alternatives on non-native fishery resources, a comparison of changes in monthly streamflows at locations in the Sacramento River, changes in monthly Delta outflow, Delta inflow to export ratios, and the changes in the position of X2 in the Delta were compared to the No Action Alternative (see page B-93 in Appendix B). Collectively, the evaluation of the changes of these flow parameters provided a comprehensive set of tools to assess the impacts of alternatives on fishery resources in the Central Valley, which, at present, represent the best scientific tools available to assess the environmental effects of the alternatives.

References

National Marine Fisheries Service. 1993. Biological Opinion for the Operation of the Federal Central Valley Project and the California State Water Project. 12 February.

U.S. Bureau of Reclamation. 1991. Appendices to Shasta Outflow Temperature Control: planning Report/ Environmental Statement: Appendix A. USDI/ BOR/ Mid-Pacific Region. November 1990, Revised May 1991.

No Action Alternative/Existing Conditions Scenario and Range of Alternatives

Several reviewers expressed concerns with the assumptions made for the National Environmental Protection Act (NEPA) No Action Alternative, as well as the California Environmental Quality Act (CEQA) Existing Conditions scenario. A number of comments were also received on the range of alternatives.

Under NEPA, the No Action Alternative is used as the baseline to which all alternatives are compared. No Action assumptions under NEPA generally include the continuation of management practices and programs absent the proposed project or action (*Memorandum: Questions and Answers about the NEPA Regulations [Forty Questions]*, 46 Fed. Reg. 18026 (March 23, 1981) as amended, 51 Fed Reg. 15618 [April 25, 1986]). Conversely, under CEQA, the proposed project and alternatives are typically compared to the existing condition rather than future conditions (CEQA Guidelines, 15125, subd. (a)). Given this document is a joint Environmental Impact Statement/ Environmental Impact Report, the Preferred Alternative, and each of the other alternatives, are compared to both the No Action Alternative per NEPA, as well as to existing conditions, per CEQA. This analysis, which held all No Action/ Existing Condition assumptions constant across each alternative to ensure a consistent and objective result, is presented in Chapter 3 of DEIS/ EIR. The discussion below identifies the primary assumptions involved in the development of each.

In addition to using the No Action Alternative and existing conditions as a baseline from which to compare alternatives, NEPA and CEQA also require that a range of feasible alternatives be identified that are capable of meeting the objectives of the proposed project. Under NEPA, the identification of a purpose and need for a proposed action drives the development of alternatives, which must be "rigorously explored and objectively evaluated" (40 C.F.R. 1502.14(a) *Forty Questions No 1(a)*). CEQA is similar in that the range of alternatives is driven by attaining "most of the basic objectives of the project" (CEQA Guidelines Section 15126.6(a)). The identification of a reasonable range of alternatives is also discussed below under "Range of Alternatives."

NEPA No Action Alternative

As described on pages 2-4 through 2-11 of the DEIS/ EIR, the No Action Alternative reflects anticipated conditions in the year 2020 and includes projections concerning future growth and associated water demands and changes in land use (this alternative also serves as the CEQA "No Project" alternative). The California Department of Water Resources (DWR) Water Plan Update (Bulletin 160-93) was used as the basis of these projections. The Bulletin is commonly used as a source of information and projections with regard to current and future conditions, as evidenced by its use in a number of completed and ongoing environmental documentation and planning efforts throughout the state.

While stakeholders may debate about the precise accuracy of some of the assumptions contained within the Bulletin, its use allows a consistent comparison of alternatives, the ability to quantitatively assess the potential effects related to water availability and deliveries, and is consistent with the methodology used for other major environmental documents including the Central Valley Project Improvement Act (CVPIA) Programmatic EIS (PEIS) and CALFED PEIS. All other components of the No Action Alternative were only included if they represented approved programs that had obtained all environmental clearances and permits, as stated on page 2-4 of the DEIS/EIR. As indicated in Chapter 2 of this FEIS/EIR, Changes to the DEIS/EIR, the erroneous statement on page 2-6 stating that the No Action flow schedule is in part due to provisions in the CVPIA has been deleted.

The No Action instream flows for the Trinity River of 340,000 acre-feet (af) were assumed because of the 1981 and 1991 Secretarial Issue documents on Trinity River flows (Andrus and Lujan Decisions, respectively). These documents assume a minimum instream flow of 340,000 af pending implementation of the final secretarial flow decision. A minimum instream flow of 340,000 af was fully evaluated under NEPA in the 1980 "EIS on the Management of River Flows to Mitigate the Loss of the Anadromous Fishery of the Trinity River, California" and the 1991 Environmental Assessment for the Lujan Decision. Some reviewers raised concerns over the inclusion of certain assumptions in the No Action Alternative, including the provisions of the CVPIA. The provisions of the CVPIA were not included in the No Action Alternative because a Record of Decision (ROD) had not been signed prior to the issuance of the Trinity River Restoration DEIS/EIR. The federal lead agencies did not want to treat as a "given" a major federal action for which full NEPA compliance is not yet final. Regardless, the inclusion of CVPIA-related provisions and assumptions would not affect the impact analysis with respect to the comparison of alternatives and rankings, given the No Action assumptions would again be fixed. Furthermore, the potential degree of impact of the implementation of the CVPIA and the proposed action is quantitatively analyzed and described in Chapter 4 Other Impacts and Commitments of the DEIS/EIR. Thus, the DEIS/EIR does reveal the extent to which CVPIA implementation would contribute to long-term impacts in the year 2020.

Some comments suggested that the use of DWR Bulletin 160-93 data was inappropriate given the 160-93 data includes projections related to land retirement as a result of the implementation of CVPIA. DWR Bulletin 160-93 was the most up-to-date information available at the time the DEIS/EIR was initiated. Additionally, DWR Bulletin 160-98, which is the most recent DWR Bulletin and was released in 1998, used the same planning horizon (2020). Urban growth projections were actually reduced somewhat in Bulletin160-98, thus, the use of Bulletin 160-93 projections provides a very conservative estimate of urban water demand. In an effort to not underestimate environmental effects, the lead agencies used the more conservative estimates from DWR Bulletin 160-93.

Retirement of privately owned irrigated lands attributable to CVPIA-related projections (assumed in Bulletin 160-93 to be approximately 30,000 acres of drainage-impaired lands) was not included in the No Action Alternative (additional land retirement identified as part of CVPIA is discussed in Chapter 4.1 Cumulative Impacts in the DEIS/EIR). As shown on page 2-5 of the DEIS/EIR, land retirement assumptions were limited to proposed state programs. Table 2-2 of the DEIS/EIR lists the key operations, policies, and regulatory requirements assumed in the No Action Alternative.

As stated on page 3-62 of the DEIS/EIR, the greatest increases in overall CVP water demand are assumed to occur north of the Delta in association with municipal and industrial (M&I) water rights and water service contracts with the CVP's American River Division. Additionally, demands on the State Water Project (SWP) are projected to require additional exports in response to increased SWP M&I demands. Key assumptions identified on page 2-7 of the DEIS/EIR related to operation of the CVP include continuing to meet the existing biological opinions for winter chinook salmon and delta smelt through adherence to the CVP Operation Criteria and Plan (CVP OCAP), the Coordinated Operations Agreement (COA) governing CVP and SWP operation, and meeting the water quality provisions of the Bay/Delta Accord Principles of Agreement.

Subsequent to the modeling analyses conducted for the Draft EIS/EIR, California Court of Appeal for the Third Appellate District struck down a portion of the Monterey Agreement signed by the Department of Water Resources and State Water Project (SWP) contractors in 1994. The agreement amendments changed the prior method of allocating water supply deficiencies, which reduced supplies to agricultural contractors before those to urban contractors were cut. The No Action and all other Trinity alternatives assume the Monterey Agreement is in place, and SWP supplies are allocated among agricultural and municipal and industrial (M&I) contractors evenly in proportion to their entitlement. The Monterey Agreement, as simulated in the No Action Alternative, has no effect on the level of SWP delivery, rather it only affects the delivery allocation to contractors south of the Delta once an overall delivery level has been determined. Therefore, the Monterey Agreement does not have any impact on the amount of water the SWP exports from the Delta. The amount of water exported is a function of demand, available supply, and export restrictions.

Accordingly, it is not anticipated that this court decision will have any significant impact on the results of the modeling analyses conducted for the Draft EIS/EIR.

CEQA Existing Conditions

The CEQA-required comparison of each alternative to existing conditions is also presented in Chapter 3 Affected Environment and Environmental Consequences of the DEIS/EIR. The Existing Conditions scenario was developed to allow for quantitative analysis with regard to water supplies and associated issue areas including agriculture and M&I impacts, but at an "existing" level of development, rather than the NEPA no action-assumed future level of development.

The existing conditions baseline used for the CEQA analysis assumed a 1995 level of population, land use, and associated water demand. The year 1995 was used as the existing conditions baseline because it correlates to timing of filing of the Notice of Preparation (NOP) by Trinity County (see CEQA Guidelines Section 15125(a)). The year 1995 is also when the Bay/Delta Accord (actually signed December 15, 1994) was initially implemented. The primary differences between the Existing Conditions scenario and the No Action Alternative are that the assumptions described above related to increased CVP demand north of the Delta, and SWP demand south of the Delta are not included. Accordingly, and as identified in a number of places in the DEIS/EIR, much of the impact identified for many of the issue areas when comparing each alternative to the Existing Conditions scenario is attributable to growth assumed to occur between 1995 and the year 2020 (i.e., the incremental dif-

ference between the population, land use, and water demands assumptions for the Existing Conditions scenario versus the No Action Alternative). In essence, much of the impact shown when comparing the alternatives to existing conditions is not attributable to the alternatives.

As stated above under "NEPA No Action Alternative," instream flows for the Trinity River were assumed to be 340,000 af/year because of the 1981 and 1991 Secretarial Issue documents (Andrus and Lujan decisions, respectively).

Range of Alternatives

As described in Chapter 2 Description of Alternatives of the DEIS/EIR, the alternatives developed and analyzed were formulated from public input, scientific information, and professional judgment, in a manner consistent with NEPA and CEQA. The alternatives carried through for analysis were deemed to meet the stated purpose and need on page 1-4 of the DEIS/EIR to "restore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam." In addition, the CEQA-related goals and objectives of the proposed action are listed on pages 1-4 and 1-5 of the DEIS/EIR and include objectives specific to Trinity County concerns including the following:

- Minimize high Trinity River water levels that would displace large numbers of residents from their homes
- Maximize the potential to attract recreationalists to Trinity County
- Minimize avoidable impacts to recreational activities on Lewiston and Trinity Reservoirs
- Protect County of Origin and Area of Origin water rights
- Comply with state and federal water quality objectives
- Comply with the Trinity County General Plan

In addition to meeting the NEPA purpose and need and the County's CEQA-related objectives, alternatives were developed to provide a range of potential actions as called for by both NEPA and CEQA (40 CFR 1505.1(e) and CEQA Guidelines Section 15126.6(a), respectively). The alternatives analyzed range from the State Permit Alternative that would result in decreased Lewiston Dam releases averaging approximately 10 percent of Trinity Reservoir inflow (and an associated export of 90 percent), to the Maximum Flow Alternative, which would use all of the inflow into Trinity Reservoir and completely eliminate water exports. Additionally, the Mechanical Restoration Alternative was developed to present an alternative that would assist in restoration through purely mechanical means, with no increase in instream flows. Finally, the Percent Inflow Alternative represents an operational approach whereby a fixed percentage of inflow into Trinity Reservoir would be released from Lewiston Dam. This range in flows, exports, and approaches represents a very broad range of potential actions to allow decision-makers the opportunity to understand the issues and impacts associated with each in determining which alternative or combination of alternatives to implement.

Alternatives Determined to be Infeasible

A number of other alternatives were also examined that were determined to be infeasible or inconsistent with the purpose and need and, therefore, were not analyzed in detail. The "Considered but Eliminated" alternatives are presented, along with the reason for their elimination in the DEIS/EIR on pages 2-35 through 2-42, Section 2.2 Alternatives Considered but Eliminated.

Over the course of the DEIS/EIR's development, many public comments were received that an alternative to remove Trinity and Lewiston Dams should be included. Such an alternative was considered to have merit with regard to long-term restoration and meeting the purpose and need of the proposed action, but was eliminated because the environmental impacts, foregone benefits, extremely long time frame, and costs associated with removing the dams were deemed excessive. This conclusion was not supported by the Yurok and Karuk Tribes, as described in Section 5.1 of the DEIS/EIR.

A harvest management alternative was also suggested by many to be a viable alternative or part of an alternative. Potential management approaches beyond the existing Pacific Fishery Management Council and Klamath Fishery Management Council plan processes were assessed, concluding that habitat, not the number of spawning adults, is the limiting factor in the production of anadromous fish in the Trinity River. The results of the assessment, which included three potential methods to assess the effectiveness of restricting harvest, are summarized on pages 2-38 through 2-40 of the DEIS/EIR, and presented in detail in Appendix B. Other alternatives suggested through public input and/or developed by the project team are also discussed in DEIS/EIR Section 2.2, Alternatives Considered but Eliminated.

Some reviewers suggested that other alternatives be analyzed. For instance, a very large number of reviewers have proposed an alternative that would release 70 percent of the inflow into Trinity Reservoir and only export the remaining 30 percent of the total inflow volume. It is important to note that these suggested alternatives fall within the range of alternatives that have been analyzed in detail. The identification of the broad range of alternatives analyzed in the DEIS/EIR in no way precludes the Secretary of the Interior from selecting a hybrid alternative from those identified, or a different alternative from those that were analyzed given such an alternative falls within the range of impacts identified in the DEIS/EIR. As stated on page 2-3 of the DEIS/EIR: "Associating certain actions with certain alternatives in a DEIS/EIR does not preclude hybridizing alternatives in an ROD; both NEPA and CEQA allow decision-makers to integrate components from various alternatives if desired," given that such an alternative would result in no greater impact than those addressed in the DEIS/EIR.

Mitigation to Listed Species/ESA Consultation

A number of reviewers asserted that the DEIS/EIR improperly deferred analysis and mitigation to listed species. In that the potential adverse effects to listed species identified in the DEIS/EIR are the subject of consultation under Section 7 of the Endangered Species Act (ESA), with both the U.S. Fish and Wildlife Service (Service) and National Marine Fisheries Service (NMFS), it was entirely appropriate to defer describing specific minimization actions until the consultations had been completed. Dialogue between the action and regulatory agencies often results in the development of minimization measures to reduce or eliminate adverse effects to listed species. Further, the Service and NMFS could not begin formal consultation until the action for consultation had been described in detail. This process was initiated with the release of the DEIS/EIR, and has been subsequently completed. Public comment will contribute toward finalization of the proposed alternative. For California Environmental Quality Act (CEQA) purposes, the County will consider the FEIS/EIR, Record of Decision (ROD), and additional findings when certifying the EIR portion of the EIS/EIR. The certified FEIS/EIR, then, will address mitigation in more detail than is found in the DEIS/EIR.

The DEIS/EIR took a conservative "worst-case" approach per CEQA related to potential impacts to listed species, as presented in Chapter 3 Affected Environment and Environmental Consequences, specifically Sections 3.5 Fishery Resources and 3.7 Vegetation, Wildlife, and Wetlands. Impacts to potentially impacted listed aquatic species (Central Valley winter-run and spring-run chinook salmon, steelhead, Sacramento splittail, and Delta smelt) are all identified as potentially significant given modeled temperature and flow impacts. Impacts to terrestrial species such as the bald eagle and northern spotted owl were found to be less than significant. Development of biological opinions (BO) by the Service and NMFS included review of the same data used to prepare the DEIS/EIR, as well as additional data where appropriate.

Per the Service's Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize delta smelt and Sacramento splittail or adversely modify critical habitat for delta smelt. The Service has concurred with the determination that implementing the Preferred Alternative will not likely adversely affect the bald eagle and northern spotted owl. It is anticipated that delta smelt and Sacramento splittail will be adversely affected by implementing the Preferred Alternative and that incidental take may be affected in manner or extent not analyzed in the March 6, 1995 Biological Opinion on the Long-term Operation of the CVP and SWP. Therefore, the following reasonable and prudent measure to minimize the effects of incidental take was developed:

1. U.S. Bureau of Reclamation (Reclamation) shall minimize the effects of reoperating the Central Valley Project resulting from the implementation of the Preferred Alternative within the Trinity River Basin on listed fish in the Delta.

Implementation of this measure will be non-discretionary.

Per the NMFS' Biological Opinion (2000; also under separate cover), implementation of the Preferred Alternative is not likely to jeopardize Southern Oregon/ Northern California Coast (SONCC) coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, or Central Valley steelhead. The NMFS does anticipate that SONCC coho salmon habitat adjacent to and downstream of the channel rehabilitation projects associated with the Preferred Alternative may be temporarily degraded during construction. Construction of these projects, which will create a substantial amount of additional suitable habitat, may temporarily displace an unknown number of juvenile coho salmon but is not expected to result in a lethal take. The NMFS does not anticipate that the implementation of the proposed action will incidentally take Central Valley spring-run chinook or Central Valley steelhead, but that the Preferred Alternative will result in a minute increase in the level of Sacramento River winter-run chinook incidentally taken in all years except critically dry years. In such years, Reclamation would be required to reinitiate consultation per the existing Winter-run Central Valley Project Operations Criteria and Plan to develop year-specific temperature control plans. Implementation of the following reasonable and prudent measures specified in the NMFS BO to minimize the effects of incidental take shall be non-discretionary and will result in minimizing impacts of incidental take of SONCC coho salmon and Sacramento River winter-run chinook salmon in all years including critically dry years:

The Service and Reclamation shall:

1. Implement the flow regimes included in the proposed action (as described in the DEIS/ EIR, page 2-19, Table 2-5) as soon as possible.

2. Ensure that NMFS is provided the opportunity to be represented during implementation of the Adaptive Environmental Assessment and Management program.

3. Ensure that the replacement bridges and other infrastructure modifications, needed to fully implement the proposed flow schedule, are designed and completed as soon as possible.

4. Periodically coordinate with NMFS during the advanced development and scheduling of the habitat rehabilitation projects described in the DEIS/ EIR.

5. Complete "the first phase of the channel rehabilitation projects" (U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, 2000) in a timely fashion.

6. Implement emergency consultation procedures during implementation of flood control or "safety of dams" releases from Lewiston Dam to the Trinity River.

7. In dry and critically dry water-year classes, Reclamation and Service shall work cooperatively with the upper Sacramento River Temperature Task Group to develop temperature control plans that provide for compliance with temperature objectives in both the Trinity and Sacramento Rivers.

Implementation of these measures will be non-discretionary.

References

National Marine Fisheries Service. 2000. Biological Opinion for the Trinity River Mainstem Fishery Restoration EIS and its effects on Southern Oregon/ Northern California Coast coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead. Southwest Region. October.

U.S. Fish and Wildlife Service. 2000. Reinitiation of Formal Consultation. Biological Opinion on the Effects of Long-term Operation of the Central Valley Project and State Water Project as Modified by Implementing the Preferred Alternative in the Draft Environmental Impact Statement/ Environmental Impact Report for the Trinity River Mainstem Fishery Restoration Program. Also, a Request for Consultation on the Implementation of this Alternative on the Threatened Northern Spotted Owl, Northern Spotted Owl Critical Habitat, and the Endangered Bald Eagle within the Trinity River Basin and where Applicable, Central Valley Reservoirs. Sacramento, CA. October.

U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation. 2000. Biological assessment for those actions in the preferred alternative of the proposed preferred Trinity River mainstem fishery restoration program that may effect listed species and their critical habitat. Enclosure to a June 5, 2000, letter from M. Spear, USFWS, and L. Snow, BOR, to R. McGinnis [sic], NMFS. June 5, 2000. 36 pp.

Exclusion of CVPIA from the No Action Alternative

The National Environmental Policy Act (NEPA) requires that all alternatives be "rigorously explored and objectively evaluated" (40 C.F.R. 1502.14(a) *Forty Questions No 1(a)*) and compared to a No Action alternative that addresses anticipated future conditions. As discussed in the thematic response titled "No Action Alternative/ Existing Conditions Scenario and Range of Alternatives," the provisions of the Central Valley Project Improvement Act (CVPIA) were not included in the No Action Alternative because a Record of Decision (ROD) on full implementation of CVPIA was not signed at the time the public draft was completed, inclusion of such provisions would not affect the comparison of alternatives, and several aspects of CVPIA have been the subject of litigation over the past several years. In essence, if the CVPIA-related provisions were included in all alternatives, the increment of impact of each alternative in comparison to the No Action Alternative would be identical to that which is identified in the DEIS/ EIR.

Accordingly, the impacts of implementation of CVPIA, along with other foreseeable future actions are presented in Section 4.1, Cumulative Impacts, of the DEIS/ EIR, and are supplemented in the additional discussion included in Chapter 2, Changes to the DEIS/ EIR, in this FEIS/ EIR. Considering the uncertainty associated with what the final decision on CVPIA will be, it is clearly appropriate to assess reasonably foreseeable effects associated with CVPIA in the cumulative effects analysis. The uncertainty and speculative nature of the implementation of portions of the CVPIA prior to the ROD being signed at the time the Trinity Public DEIS/ EIR was issued, namely, the management of water related to Section 3406 (b)(2) of the CVPIA, is underscored by the reviewers themselves as evidenced by Comment 5314-93, "The authority [sic] recognizes that it may not be feasible to model the accounting system that Department of Interior is using for (b)(2) implementation. " An additional analysis using the October 5, 1999 Decision on Implementation of Section 3406(b)(2) of the CVPIA is provided in Chapter 2 of the FEIS/ EIR, Changes to the DEIS/ EIR. The additional analysis was not provided in the DEIS/ EIR because the DEIS/ EIR was released prior to the decision on implementation of Section 3406(b)(2). The level of anticipated impact (i.e., significance) associated with implementation of 3406(b)(2) for all issue areas addressed in the DEIS/ EIR remains the same as in the DEIS/ EIR.

From a California Environmental Quality Act (CEQA) standpoint, there is no question that it was appropriate not to assume CVPIA implementation as part of the No Project analysis. CEQA Guidelines Section 15126.6(e)(2) provides that a No Project alternative shall discuss "existing conditions" and "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and available infrastructure and community services." Because there is not yet an approved ROD for the CVPIA, it would have been inaccurate for Trinity County, as CEQA lead agency, to assume full CVPIA implementation as part of "current plans." In any event, the inclusion of CVPIA implementation in the cumulative impact analysis provides readers with information regarding how that implementation, along with other activities foreseeable in 2020, would

affect the environmental resources relevant to the Trinity River Mainstem Fishery Restoration project. (See thematic response titled "Cumulative Impacts Analysis.")

Requests for Recirculation

A number of reviewers have stated that the DEIS/EIR is deficient in some way and thus must be recirculated. The lead agencies strongly disagree that the DEIS/EIR is deficient and must be recirculated. Contrary to the reviewers' assertions, the DEIS/EIR represents a thorough, carefully developed environmental analysis using the best information available allowing for meaningful public comment. Additional information has been added to the FEIS/EIR in responses to public comment; however, this information is mainly for clarification purposes and does not represent significant new information requiring recirculation (see Responses 5313-11 through 5313-18 and thematic responses titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives" and "Cumulative Impacts Analysis").

"Recirculation" is a term commonly associated with the California Environmental Quality Act (CEQA), rather than the National Environmental Policy Act (NEPA). The NEPA equivalent of recirculation is the preparation of a "Supplemental EIS." The NEPA regulations adopted by the Council on Environmental Quality (CEQ) state that a federal agency must prepare a supplement to either draft or final environmental impact statements if:

> "(i) The agency make substantial changes in the proposed action that are relevant to environmental concerns; or
>
> (ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts."
>
> (40 C.F.R. Section 1502.9 (c)(1).)

In addition, a federal agency "[m]ay also prepare supplements when the agency determines that the purposes of [NEPA] will be furthered by doing so." (Id., subd. (c)(2).) The law is clear, however, that a federal agency "need not supplement an EIS every time new information comes to light after the EIS is finalized." (Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 373 [1989].) Rather, such an obligation occurs only where the new information is "significant." The CEQ regulations do not define this term. As a result, a federal lead agency must determine for itself whether the new evidence is significant. (State of Wisconsin v. Weinberger, 745 F.2d 412, 417-418 (7th Cir. 1984).) Whether the new information is significant turns on its qualitative and quantitative value under the circumstances of the particular project. (Sierra Club v. Marsh, 714 F.Supp. 539, 569 (D.Me.), *on reconsideration,* 744 F.Supp. 352 (D.Me. 1989), *appeal dismissed*, 907 F.2d 210 (1st Cir. 1990).)

To trigger the requirement to prepare a supplemental EIS, the new information must paint a "*seriously* different" picture of the project's environmental impacts. (Sierra Club v. Froehlke, 816 F.2d 205, 210 (5th Cir. 1987) (emphasis in original).) Another court stated:

> "[T]he principal factor an agency should consider in exercising its discretion whether to supplement an existing EIS because of new information is the extent to which the new information presents a picture of the likely environmental consequences

> associated with the proposed action not envisioned by the original EIS. The issue is whether the subsequent information raises new concerns of sufficient gravity such that another, formal, in-depth look at the environmental consequences of the proposed action is necessary."
>
> (State of Wisconsin v. Weinberger, supra, 745 F.2d at page 418; see also Township of Springfield v. Lewis, 702 F.2d 426 (3d Cir. 1983).)

As these legal authorities make clear, the determination whether to prepare a supplemental EIS should turn on whether the new information paints a "seriously different" picture of the project's environmental effects, as compared to the picture painted by the Draft EIS. Here, none of the new information in the Final EIS rises to that level.

CEQA has its own standards governing recirculation. These are set forth in CEQA Guidelines section 15088.5, which state in pertinent part as follows:

> "[a] lead agency is required to recirculate an EIR when significant new information is added to the EIR after public notice is given of the availability of the draft EIR for public review under Section 15087 but before certification."

"Significant new information" is limited to information showing that:

> (1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
>
> (2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.
>
> (3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the significant environmental impacts of the project, but the project's proponents decline to adopt it.
>
> (4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded."
>
> (CEQA Guidelines, section 15088.5, subd. (b).)

The new information included in the FEIS/EIR does not include anything that triggers recirculation under these standards. In particular, the final document does not reveal any new significant effects, or substantial increases in previously identified significant effects. Nor can any reviewer credibly assert that the DEIR portion of the Draft environmental document was "so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded."

Mitigation for Significant Impacts

A number of reviewers have proposed adding further mitigation measures to the project to further reduce some of its environmental impacts. For example, the California Department of Conservation has suggested that, to mitigate impacts to agricultural areas whose water supplies may be reduced, the FEIS/EIR should explore the feasibility of providing "compensation for the loss of irrigated farmland by the purchase of conservation easements on other irrigated farmland of equivalent quality and quantity." A number of reviewers have mistakenly asserted that the lead agencies must describe and implement measures to mitigate for all identified significant impacts. Other reviewers have asserted that reliance on Central Valley Project Improvement Act (CVPIA) and CALFED constitutes inadequate mitigation; and some reviewers assert that the DEIS/EIR offers no mitigation for significant impacts.

It is important to remember to view the Trinity River Fishery Restoration Project in its appropriate context. This project is essentially mitigation for the substantial environmental degradation that has taken place on the mainstem Trinity River since construction and operation of the Trinity River dams. The lead agencies are proposing to implement a program that is expected to result in substantial environmental benefits. The most prominent benefits include restoring the ecological processes of the Trinity River, its fish populations, and the Tribes that depend on Trinity River resources as part of their cultural identity. Additionally, there are several ongoing programs in the Trinity River Basin that are expected to improve environmental conditions for fish, wildlife, and people. These include major programs such as the President's Northwest Forest Plan, the Five Counties Coho Conservation Plan (see page 4-8 of the DEIS/EIR), Lower Klamath Restoration Partnership (page 4-10 of the DEIS/EIR), Changes in California Forest Practice Rules (page 4-10 of the DEIS/EIR), and Total Maximum Daily Load (page 4-9 of the DEIS/EIR). Major programs are also being initiated in the Central Valley of California, the most prominent being CVPIA and CALFED. Implementation of these programs is also expected to result in substantial environmental benefits to fish and wildlife resources throughout the Central Valley and Delta in addition to balancing water use for human needs.

As would be expected with any project of the magnitude of the Trinity River Mainstem Fishery Restoration Project, there are other effects to the human environment associated with the very positive environmental effects of implementing the fishery restoration activities as detailed in the DEIS/EIR. Regarding the significant impacts noted in the DEIS/EIR, it is important for reviewers to understand that under NEPA (40 CFR 1502.16(h)), federal agencies are required to identify and discuss means to mitigate adverse effects but are not obligated to implement those identified measures. Federal agencies can decide to implement actions resulting in significant impacts so long as the agency has assessed the environmental ramifications of doing so. (Robertson v. Methow Valley Citizen Council, 1989. "NEPA…simply prescribes the necessary process for preventing uninformed, rather than unwise, agency actions.… If the adverse environmental effects of the proposed action are adequately identified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs.")

Because water is a finite resource, the partial restoration of the Trinity River will "cause" some impacts for which there is simply no mitigation. The same water molecule cannot flow down the Trinity and also flow down the Sacramento. Thus, the nature of this project is such that mitigation for all impacts simply is not possible. Even so, the DEIS/EIR does offer a number of mitigation measures, which represent the lead agencies' best efforts to formulate mitigation where possible.

Unlike NEPA, CEQA requires the adoption of any "feasible" mitigation measures that can substantially lessen or avoid the significant effects of a proposed project. In the context of the Trinity River Mainstem Fishery Restoration Project, the key question for any proposed mitigation measure is whether the measure may be "feasible" within the meaning of that term as defined in CEQA.

The CEQA Guidelines define "feasible" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, *legal*, social, and technological factors." (CCR, title 14, § 15364 [emphasis added].) As the California Legislature has made clear, CEQA does not grant public agencies any powers beyond those they already enjoy pursuant to their organic powers or enabling legislation. (Public Resources Code, § 21004.) Thus, proposals that agencies have no regulatory power to impose are "legally" infeasible. (See Kenneth Mebane Ranches v. Superior Court (1992) 10 Cal.App.4th 276, 291-292; Concerned Citizens of South Central Los Angeles v. Los Angeles Unified School District (1994) 24 Cal.App.4th 826, 842.)

Although Trinity County has acted as the CEQA lead agency in preparing the DEIS/EIR document, it is important to understand Trinity County's role in the scope of the fishery restoration efforts. The County has no direct regulatory authority over any aspect of the overall project other than in issuing the permits that will be required for channel modification and gravel reintroduction projects occurring within Trinity County. The County, then, simply has no ability to require that, for example, the U.S. Bureau of Reclamation (Reclamation) obtain conservation easements in existing agricultural areas within the Central Valley as a means of mitigating the loss of agricultural water supplies in other areas. Reclamation in complying with NEPA and other federal laws, must determine for itself whether to pursue such mitigation strategies. (See also 40 C.F.R. § 1503.4 [scope of obligation to respond to comments in FEIS].)

As explained in the DEIS/EIR, there is some chance that the California State Water Resources Control Board (SWRCB) may eventually take action as a "responsible agency" with respect to the project (see DEIS/EIR pages 1-21 and 5-3). Although the federal lead agencies do not require the SWRCB's permission to implement the proposed "flow decision," Trinity County retains the option of pursuing a still-pending 1990 petition with SWRCB as a means of obtaining formal changes to Reclamation's Trinity River water permits.

If the County were to pursue its pending petition, and the SWRCB were to modify Reclamation's Trinity River water permits, the effect of such actions would be to formally integrate the terms of the Department's flow decision into documents that have the force of state water law. (See California v. United States [1978] 438 U.S. 645, 650, 665-669, 674-679; Pub. L. No. 102-575 [Oct. 30, 1992], § 3406[b].) If and when the SWRCB reviews any such petition from Trinity County, SWRCB, as a responsible agency subject to CEQA, will have to

decide whether particular proposed measures, such as those proposed by the California Department of Conservation, are "feasible" within the meaning of CEQA. Such determinations will turn, in part, on the SWRCB's assessment of the reach of its own regulatory powers. The SWRCB might well conclude that it lacks the power to regulate activities traditionally seen as involving "land use" issues.

Some reviewers have misunderstood the purpose for which the DEIS/EIR mentioned ongoing water planning efforts such as CALFED and CVPIA. The DEIS/EIR mentions those efforts because they are clearly relevant to some of the issues implicated by the Trinity River Mainstem Fishery Restoration Project. Thus, the DEIS/EIR states in a number of locations, including page 3-119, that actions contemplated under the ongoing CALFED and CVPIA programs "could" assist in addressing water supply and demand related concerns and that "none of these actions would be directly implemented as part of the alternatives discussed in (the) DEIS/EIR." While it is recognized that many of the programs identified in the DEIS/EIR attributable to the CALFED and CVPIA programs could indeed result in increasing supplies and/or limiting demands so as to minimize potential impacts of decreases in Trinity exports (e.g., both the CVPIA and CALFED environmental documents assume increased Trinity flows), relying on such programs is considered to be too speculative at present. Accordingly, any water-supply induced impacts that are projected to result in significant secondary impacts to resources such as groundwater are disclosed in Section 4.3 Irreversible and Irretrievable Commitments of Resources and Significant Impacts that Would Remain Unavoidable Even After Mitigation as significant, unavoidable impacts. In other words, the DEIS/EIR nowhere relies on CALFED or CVPIA programs as a basis for claiming that project impacts have been, or could be, mitigated.

However, the document does propose mitigation measures for impacts on fisheries, water quality, vegetation, and wildlife. Specific mitigation measures are identified in the DEIS/EIR; examples related to potential turbidity impacts are identified in Section 3.4 Water Quality (page 3-148), and habitat and vegetation impacts are identified in Section 3.7 Vegetation, Wildlife, and Wetlands (pages 3-241, 3-256, and 3-260). These are further explained in responses to other comments such as responses to Comment Letter 5313 and thematic response titled "Mitigation for Listed Species/ESA Consultation." Consultation under Section 7 of the ESA (under separate cover) has provided measures for mitigating impacts to particular listed species. Implementation of the Preferred Alternative is not likely to jeopardize delta smelt, Sacramento splittail, bald eagle, and northern spotted owl (per the Service's Biological Opinion [BO]) or Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and Southern Oregon/Northern California Coast coho salmon (per the NMFS' BO) given the implementation of reasonable and prudent measures specified in each BO and listed in the thematic response titled "Mitigation to Listed Species/ESA Consultation."

Implementation Funding and Relationship to Repayment, Reimbursement, and the CVPIA Restoration Fund

A number of reviewers representing environmental, tribal, water, and power interests raised concerns about the effects on existing repayment programs and commitments (including the surcharges to the Restoration Fund) from implementing any of the DEIS/EIR alternatives. The implementation of any of these alternatives, including the Preferred Alternative (or hybrid alternative potentially selected by the Secretary of the Interior), require funding for successful implementation. Concerns were raised during the public review of the DEIS/EIR that such costs could be borne by Central Valley Project water and power users. In response to these concerns, the lead agencies have requested that the Solicitor provide guidance as to which costs of implementing the Preferred Alternative are reimbursable and which are not. We are expecting his opinion in the very near future. In an effort to provide full disclosure, however, the Department of the Interior notes that estimated annual program costs range from approximately $12 million in the first and subsequent years to a high of $17 million in the second year (increase due primarily to infrastructure improvements such as bridge replacements). Depending on the outcome of the Solicitor’s analysis, the reimbursable obligation would be a percentage (anywhere from zero percent to 100 percent) of these costs. Any reimbursable obligation would then be allocated among commercial power, irrigation, and municipal and industrial user groups in the following manner:

Commercial Power (57.6 percent)
Irrigation (35.9 percent)
Municipal and Industrial (6.5 percent)

These percentages were derived from the plant-in-service allocation of the Trinity River Division currently in place.

Powerplant Bypass

Several reviewers expressed concerns that Trinity Powerplant bypasses through the auxiliary outlet for temperature control were not analyzed for losses in power generation or benefits in meeting temperature objectives in the Trinity and Sacramento Rivers. The DEIS/EIR on page 3-149, and Technical Appendix A "Trinity Dam Auxiliary Outlet Releases" describe the auxiliary releases as a potential mitigation measure for temperature control in the Trinity and Sacramento Rivers. These auxiliary releases would occur during dry periods of low reservoir storage when water releases from the Trinity Powerplant are too warm to meet downstream temperature requirements.

As identified in Section 3.4 Water Quality, Table 3-8 of the DEIS/EIR, temperature violations under the Flow Evaluation/Preferred Alternative would be less than the No Action Alternative in all year classes. This is due to the higher carryover storage level assumption made for the alternative (600 thousand acre-feet [taf] versus 400 taf for the No Action Alternative) as well as the shift in timing of exports (exports would be shifted to the summer/fall period in comparison to the No Action Alternative export pattern). As such, bypasses would be less likely to be needed than under the No Action Alternative. However, given the comments received and the projected impacts identified for the other alternatives, the lead agencies have further evaluated bypass operations for temperature control benefits and costs to CVP power customers. See thematic response titled "Power Analysis" with regard to the potential effects of reduced power generation associated with bypass operations.

Trinity Powerplant bypasses for temperature control are not "normal" operating procedures for operation of the TRD in the sense that auxiliary releases for temperature control do not occur every year. Trinity Powerplant bypasses are not specifically mentioned in the existing Central Valley Project Operations Criteria and Plan (CVP-OCAP) as an operating procedure for temperature control. However, Trinity Powerplant bypasses were used by Reclamation in 1977, 1991, and 1992 to protect Trinity River and Sacramento River fisheries from adverse water temperatures. Trinity bypass operations may be used again in the future, regardless of which alternative is selected by the Secretary of the Interior (Secretary), although the frequency of bypasses would vary by alternative (see Table 2). The following documents and examples confirm the use and benefit of Trinity auxiliary releases for temperature control:

- The Biological Assessment for Reclamation's Long-term Central Valley Project Operations Criteria and Plan (dated October 1992) states on page 5-3, bullet 4: ***"Release water from the low level outlet at Trinity Dam when effective for temperature control.***"
- In 1992 when the Trinity Bypass was used, there was a Biological Opinion in affect on the CVP from National Marine Fisheries Service (NMFS). When NMFS made a finding that the selected operation that included the Trinity bypass was compliant with the Biological Opinion, it confirmed the use of the bypass as a ***"reasonable and prudent measure"*** to conserve the species (consistent with the Biological Assessment).

- In 1991 and 1992 when the Trinity Bypass was used, U.S. Bureau of Reclamation (Reclamation) submitted the selected temperature control plan to the State Water Resources Control Board (SWRCB) pursuant to implementation of Water Right Orders 90-05 and 91-01. The operation and plan were accepted by the SWRCB, which affirmed that the Trinity Bypass was a ***"controllable factor"*** that could be used to help attain temperature objectives in the Trinity and Sacramento Rivers.

Analysis Approach

As described above, bypasses are not a standard operating procedure. Historically, bypasses have been implemented when reservoir storage has dropped below 750 taf (between July 1 and September 30) or even 1,000 taf (October) depending on specific conditions. Accordingly, the analysis modeled the potential for such bypasses, given these carryover storage thresholds for each alternative, including existing conditions. Given such bypasses would only occur in particularly dry and/or "extreme" conditions, this approach should be viewed as a "worst-case" analysis. The modeling assumes that when bypasses are warranted, 100 percent of the Trinity Reservoir releases are directed through the auxiliary outlet works up to a maximum capacity of approximately 2,000 cubic feet per second (cfs) (pursuant to Reclamation's bypass capacity rule curves that relate maximum auxiliary bypass capacity to reservoir stage). Actual future operations may vary according to actual conditions such as reservoir storage, weather conditions, volume of cold water available, etc. Table 1 identifies the number of months when bypasses were modeled to occur (i.e., the 750 taf and/or 1,000 taf threshold were exceeded) for each alternative. In general, the majority of bypasses identified were projected to occur in October given such months are the beginning of the water year (i.e., the reservoir would typically be at its lowest level during the year).

TABLE 1
Frequency of Bypasses During July through October of Simulation Period (1922-1990)

Flow Alternative	Total Number Bypasses (months)	Bypasses as Percentage of Time (for July through Oct period only) %
No Action	38	13.8
Maximum Flow	31	11.2
Flow Evaluation	26	9.4
Percent Inflow	32	11.6
Existing Conditions	38	13.8
Cumulative Effects (600 taf)	40	14.5
Cumulative Effects (400 taf)	73	26.4

Trinity River temperature modeling was performed using the RTM, BETTER, and SNTEMP models as described on pages 3-134 and 3-135 of the DEIS/EIR. The Sacramento River Salmon Mortality Model ("LSALMON2" developed by Reclamation) was used to evaluate Sacramento River salmon mortality. The Sacramento River Basin Temperature Model ("LSACTEM3" developed by Reclamation) was used to evaluate Sacramento River temperature-related impacts. A more detailed description of the models used is presented in Technical Appendix A Water Resources/Water Quality. The thematic response "Use of

Water Delivery and Related Models" summarizes the use of these models and the key assumptions used.

Cost of Bypassing Trinity Powerplant

Historically, Reclamation has occasionally made low-level releases at Trinity Dam to assist in meeting downstream water temperature requirements during particularly dry years. During such releases, all of the water that would normally pass through the power turbines is bypassed, and the generators are shut down.

The removal of Trinity generation eliminates firm load-carrying capacity and the ability to provide any operating reserves for the 4-month period between July and October. Data developed for the No Action Alternative indicates that the Trinity Powerplant contributes an average of 85 Megawatts (MW) of firm load-carrying capacity per month during the 4-month period noted. In addition, the powerplant could contribute approximately 20 MW of operating reserves during each month of the dry period. Since this capacity would be lost during the most severe times when it is needed most, it can be assumed an alternate source of firm load-carrying capacity would be needed. Applying the replacement capacity value used in the DEIS/EIR ($8.99/Kilowatt [kW] per month) the net impact associated with the loss of this capacity would be approximately $3,200,000 for the 4-month period. This additional cost would be incurred in any year with potential bypasses because the potential for bypass operations eliminates the reliable use of the Trinity Powerplant. The reduction in average energy for any of the potential bypass months over the period of record would not significantly alter the above cost estimate because the average generation for all months would not be notably changed.

To determine the value of a hydropower project, traditional power planning practices dictates an examination of the CVP during the worst hydrologic conditions. This examination determines the project's ability to meet load. Due to the nature of the capacity being lost, the generation at Trinity will no longer be available to meet the capacity needs of the power grid under traditional hydropower planning criteria. If generation were completely lost at the Trinity Powerplant for 4 months in the driest years, Trinity Powerplant would no longer be considered available to carry load under the planning criteria and would lead to a need for new capacity to be added to the system or purchased from the market.

Summary of Results

The following summarizes the anticipated benefits of implementing bypasses for each alternative, as well as the cumulative condition, for the Trinity and Sacramento Rivers.

Trinity River

Table 2 shows modeled results for compliance with Trinity River temperature objectives contained in the "Water Quality Control Plan for the North Coast Region." As shown in this table, bypasses could provide benefits with regard to some alternatives, while others (e.g., the Percent Inflow and Maximum Flow Alternatives) would be generally unaffected. Interestingly, the greatest potential for improvement was identified for the No Action and

Existing Conditions scenarios. Such additional bypasses were not assumed to occur in the DEIS/EIR given, as described above, bypasses have been implemented, but only in particularly dry conditions. Regardless, the analysis confirms that while bypasses clearly can provide additional benefits, either:

1. No appreciable benefits would occur for Maximum Flow (even with this alternative's substantial releases during certain times of the year, water does not move quickly enough through Lewiston Reservoir to avoid warming; the other alternatives avoid this phenomenon by exporting water to the Central Valley, resulting in water moving through the reservoir more quickly) or Percent Inflow (due to the relatively low release rates associated with this alternative, particularly in critically dry and dry years).

2. Benefits could be realized for the Flow Evaluation (Preferred Alternative) in critically dry years, but even without bypasses this alternative remains superior to the No Action Alternative.

The projected cumulative condition was modeled using an assumed Trinity Reservoir carryover storage level of 400 taf and 600 taf (also see thematic response titled "Cumulative Impacts"). Table 2 also shows that bypasses could play a substantial role in decreasing temperature-related effects, particularly with regard to the cumulative condition and the 400 taf carryover storage limit.

Sacramento River

Table 3 shows modeled results for compliance with Sacramento River temperature requirements found in the 1993 Biological Opinion for winter-run chinook salmon, while Table 4 shows the associated modeled results for Sacramento River chinook salmon relative mortality. As shown in these tables, bypasses for any of the alternatives (including for the two cumulative conditions) would have no to very limited benefits to Sacramento River fisheries in general. However, in some years (usually dry), bypasses did result in temperature decreases during August - November ranging from 0.50°F to 1.00°F. These decreases translated into some small reductions in salmon losses in some years (generally 3 percent or less). In particular, a No Action reduction of 15 percent was identified to occur in 1935 for the spring-run salmon. As such, while on average benefits were not found to be substantial, bypasses were found to be useful in individual, generally dry years.

As identified in Section 3.3 Water Resources of the DEIS/EIR on pages 3-52 and 3-54, temperature compliance problems and associated fish mortality can occur as a result of the warming of water in Whiskeytown Reservoir before it is conveyed into the Sacramento River at Keswick Reservoir. As discussed above, bypasses may be able to assist in aiding operations with regard to temperature compliance in particularly dry years.

A detailed memorandum at the end of this thematic response from Tom Stokely to Greg Kamman provides additional information relating to bypass analysis.

TABLE 2
Modeled Trinity River Temperature Violations With and Without Trinity Bypasses
(Percentage of Violations by Representative Year Class)

Alternative	Year Type	No Bypasses (%)	Bypasses (%)
No Action	Extremely Wet	0	0
	Wet	0	0
	Normal	2	0
	Dry	24	24
	Critically Dry	78	5
Maximum Flow	Extremely Wet	73	73
	Wet	28	28
	Normal	28	28
	Dry	29	29
	Critically Dry	29	28
Flow Evaluation	Extremely Wet	0	0
	Wet	0	0
	Normal	1	0
	Dry	1	0
	Critically Dry	6	0
Percent Inflow	Extremely Wet	53	53
	Wet	74	74
	Normal	86	87
	Dry	87	87
	Critically Dry	100	100
Existing Conditions	Extremely Wet	0	0
	Wet	0	0
	Normal	3	0
	Dry	0	0
	Critically Dry	84	4
Cumulative Effects (600 taf minimum storage)	Extremely Wet	0	0
	Wet	0	0
	Normal	8	0
	Dry	12	0
	Critically Dry	9	0
Cumulative Effects (400 taf minimum storage)	Extremely Wet	0	0
	Wet	0	0
	Normal	29	0
	Dry	41	0
	Critically Dry	71	6

[a]Year classes used for the BETTER model include 1983 (extremely wet), 1986 (wet), 1989 (normal), 1990 (dry), and 1997 (critically dry).

TABLE 3
Total Number of Sacramento River Temperature Violations:
Trinity Auxiliary Outlet No Bypass and Bypass Conditions (1922-1990 Simulation Period)

Flow Alternative	No Bypass Simulations	Bypass Simulations
No Action	77	78
Maximum Flow	110	110
Flow Evaluation	99	99
Percent Inflow	97	97
Existing Conditions	69	69
Cumulative Effects (600 taf)	103	104
Cumulative Effects (400 taf)	96	96

TABLE 4
Percent Change In Temperature-related Losses of the Early Life Stages of Anadromous Salmonids in the Sacramento River:
Comparison Between Trinity Dam Auxiliary No Bypass and Bypass Conditions (1922-1990 Simulation Period)

Flow Alternative	Fall Run	Late-fall Run	Winter Run	Spring Run
No Action	-0.1	0.0	-0.1	-0.3
Maximum Flow	0.0	0.0	0.0	0.0
Flow Evaluation	0.0	0.0	-0.1	0.0
Percent Inflow	-0.1	0.0	-0.1	-0.1
Existing Conditions	-0.1	0.0	0.0	-0.2
Cumulative Effects (600 taf)	-0.1	0.0	0.0	-0.2
Cumulative Effects (400 taf)	-0.1	0.0	0.0	-0.2

MEMORANDUM

To: Tom Stokely, Trinity County Planning Department
From: Greg Kamman, Kamman Hydrology & Engineering
Date: February 16, 2000
Subject: Trinity Dam Auxiliary Bypass Analysis

This memorandum presents the results of an analysis to evaluate when auxiliary bypasses should be initiated at Trinity Dam in an effort to reduce downstream Trinity River temperatures and decrease violations with SWRCB temperature objectives. In addition, this memorandum summarizes the results of the Bureau's temperature modeling analysis to evaluate auxiliary bypass effects on the Sacramento River.

How to Determine Bypasses

Based on analysis of previous temperature modeling results for proposed flow study alternatives, an operational rule for low-level auxiliary bypasses was developed from the relationship between Trinity Lake storage level and observed compliance with downstream temperature objectives. From these data, it was observed that temperature compliance is met for the period July 1 through September 30 during all year-types and for the majority of alternatives when Trinity Lake storage is at or above about 750 TAF (see Figures 1 and 2). No temperature compliance versus end-of-month storage relationship was observed for the Percent Inflow and Maximum Flow alternatives during the July through September period. It appears that these two alternatives don't provide enough river releases to meet downstream temperature objectives, regardless of release temperature and/or reservoir storage values. During October (after the temperature compliance point shifts from Douglas City to the North Fork Trinity River), very few violations occur under the Cumulative Effect and Flow Evaluation alternatives when reservoir storage is at or above 1000 KAF (see Figure 1). This October relationship does not exist for the remainder of the alternatives as releases are just too low leading to consistent violations, regardless of Trinity Lake storage (see Figure 2). Thus, based on this analysis, temperature model simulations were completed which included low-level bypasses when Trinity Lake storage drops below 750 TAF during the months of July, August and September and below 1000 TAF during the month of October. These model runs assume that 100% of the Trinity Lake releases were directed through the low level bypass pursuant to bypass capacity rule curves that relate maximum auxiliary bypass capacity to reservoir stage. Based on these criteria, Table 1 presents the frequency of auxiliary bypasses, by Alternative, that would have occurred during the 1922 through 1990 simulation period.

TABLE 1: Frequency of Bypasses during July through October of Simulation Period (1922-1990)

Flow Alternative	Total Number Bypasses (months)	Bypasses as Percentage of Time (for July through Oct period only)
No Action	38	13.8%
Percent Inflow	32	11.6%
Maximum Flow	31	11.2%
Flow Study	26	9.4%
Existing Conditions	38	13.8%
Cumulative Effects (600 TAF)	40	14.5%
Cumulative Effects (400 TAF)	73	26.4%

Effects on Trinity River Temperatures

Auxiliary bypasses were evaluated using the temperature models (Reclamation's Trinity River Temperature Model, BETTER, and SNTEMP) to determine if there was a decrease in the number of violations with downstream Trinity River temperature objectives. Compliance with downstream temperature objectives was determined using the USFWS's median hydrometeorological evaluation criteria. In short, incorporating low-level bypasses into TRD summertime operations effectively reduce temperature violations for many of the alternatives and evaluation scenarios. Presented below are summaries of how each alternative performed at meeting Trinity River temperature objectives under auxiliary bypass operations. Results are presented on Table 2.

1) No Action Alternative: Without bypasses, the temperature violations occurred only 2% of the time under the normal year-type, 24% of the time during the dry year, and 78% of the time under the critically dry year-type. Under the simulated bypass criteria, bypasses were implemented during the normal and critically dry year-types with violations being eliminated during the representative normal year-type and reduced to 5% during the critically dry year-type. Because no bypasses were simulated during the dry year-type (i.e. Trinity Lake storage did not drop below 750 TAF during July through September or 1000 TAF during October), violations remain at 24%.

2) Cumulative Effects: Violations were eliminated when bypasses were implemented during the normal, dry, and critically dry year-types under the 600 TAF minimum Trinity Lake storage level scenario. Without bypasses, violations occur 8%, 12%, and 9% of the time, respectively. Similarly, there were significant improvements under the 400 TAF version; violations were eliminated during normal and dry year-types and significant decreases in violations (from 71% to 6%) during the representative critically dry year-type.

3) Flow Study Alternative: Under non-bypass conditions, there were only a few violations during normal, dry, and critically dry year-types (1%, 1%, and 6%, respectively). However, modeling results indicate that incorporating auxiliary bypasses during these years eliminates all violations.

4) Existing Conditions: Bypasses were implemented during the normal and critically dry year-types (the only years that had violations under non-bypass operations). Violations dropped from 3% to 0% during the normal year-type and from 84% to 4% during the critically dry year-type.

5) Percent Inflow Alternative: Bypasses did not improve compliance with downstream temperature objectives. Under this scenario, bypasses were implemented during the wet, normal, and critically dry year-types with no change in the number of daily violations.

6) Maximum Flow Alternative: Interestingly, bypasses were triggered during the extremely wet year-type as well as the critically dry year-type. Bypass operations did not significantly improve temperature compliance for either of these year-types.

Effects on Sacramento River Temperatures

Auxiliary bypasses were also evaluated to determine if they would have any impact on Sacramento River temperatures. This evaluation, which included simulations of Trinity Dam auxiliary bypass operations, was completed using Reclamation's Sacramento River Temperature Model. Similar to previous analyses, results consisted of tabulating the total number of (monthly) temperature violations on the Sacramento River for each alternative over the 69-year analysis period (1922 through 1990). Model simulation results indicate that bypass operations decrease Sacramento River temperatures slightly (less than 1 degree Fahrenheit). However, these benefits are so slight that they have no effect on the total number of temperature violations on the Sacramento River between bypass and no bypass conditions for all

TABLE 2: Temperature Violations on Trinity River: Temperature Model Results (percent of violations by representative year-type)

Alternative	Year type	No Bypasses	Bypasses
No Action	ex. wet	0%	0%
	wet	0%	0%
	normal	2%	0%
	dry	24%	24%
	crit. dry	78%	5%
Cumulative Effects (400 TAF min storage)	ex. wet	0%	0%
	wet	0%	0%
	normal	29%	0%
	dry	41%	0%
	crit. dry	71%	6%
Cumulative Effects (600 TAF minimum storage)	ex. wet	0%	0%
	wet	0%	0%
	normal	8%	0%
	dry	12%	0%
	crit. dry	9%	0%
Flow Evaluation	ex. wet	0%	0%
	wet	0%	0%
	normal	1%	0%
	dry	1%	0%
	crit. dry	6%	0%
Existing Conditions	ex. wet	0%	0%
	wet	0%	0%
	normal	3%	0%
	dry	0%	0%
	crit. dry	84%	4%
Percent Inflow	ex. wet	53%	53%
	wet	74%	74%
	normal	87%	87%
	dry	87%	87%
	crit. dry	100%	100%
Maximum Flow	ex. wet	73%	73%
	wet	28%	28%
	normal	28%	28%
	dry	29%	29%
	crit. dry	29%	28%

alternatives with two exceptions. The Cumulative Effect simulation displayed a small decrease in the number of violations, with 104 violations occurring under no bypass Conditions and 103 violations when bypasses were included. Conversely, under the No Action Alternative, there were a total of 77 violations under no bypass simulations and 78 violations under the bypass simulation. It does not make sense that there would be an increase in temperature violations under bypass conditions that have the net effect of lowering water temperatures on the Sacramento River. Thus, both of these slight changes may be considered to be anomalies, attributable to noise in the Reclamation Temperature Model. A summary of these results, as total temperature violations over the period of record, are presented on Table 3.

TABLE 3: Total Number of Sacramento River Temperature Violations - Trinity Auxiliary Outlet No Bypass and Bypass Conditions (1922-1990 simulation period)

Flow Alternative	No Bypass Simulations	Bypass Simulations
No Action	77	78
Percent Inflow	97	97
Maximum Flow	110	110
Flow Study	99	99
Existing Conditions	69	69
Cumulative Effects (600 TAF)	103	104
Cumulative Effects (400 TAF)	96	96

Effects on Sacramento River Chinook Salmon Mortality

The Sacramento River Temperature Model results were also run through the Sacramento River Salmon Mortality Model. This model estimates the temperature effects to chinook salmon eggs and fry for all four salmon runs spawning between Keswick Dam and Woodson Bridge. An important assumption of the Salmon Mortality Model is that increases in salmon egg and fry life-stage mortality are a result of increased Sacramento River water temperature. Similar to the changes in temperature violations discussed above, modeled changes in salmon mortality due to routine bypasses through the Trinity Dam auxiliary bypasses are very small. Table 4 summarizes the salmon mortality model results. These results indicate that auxiliary bypasses have little to no effect on salmon egg and fry mortality on the Sacramento River. However, wherever there is a change, it is always a net decrease in salmon mortality.

TABLE 4: Percent Change in Temperature-related Losses of the Early Life Stages of Anadromous Salmonids in the Sacramento River: Comparison between Trinity Dam No Bypass and Bypass Conditions (1922-1990 simulation period)

Flow Alternative	Fall run	Late-fall run	Winter run	Spring run
No Action	-0.1	0.0	-0.1	-0.3
Percent Inflow	-0.1	0.0	-0.1	-0.1
Maximum Flow	0.0	0.0	0.0	0.0
Flow Study	0.0	0.0	-0.1	0.0
Existing Conditions	-0.1	0.0	0.0	-0.2
Cumulative Effects (600 TAF)	-0.1	0.0	0.0	-0.2
Cumulative Effects (400 TAF)	-0.1	0.0	0.0	-0.2

FIGURE 1

Comparison of End-of-Month Storage to Temperature Compliance: (Cummulative Effects and Flow Study Alternatives) wet through critically dry water year-types

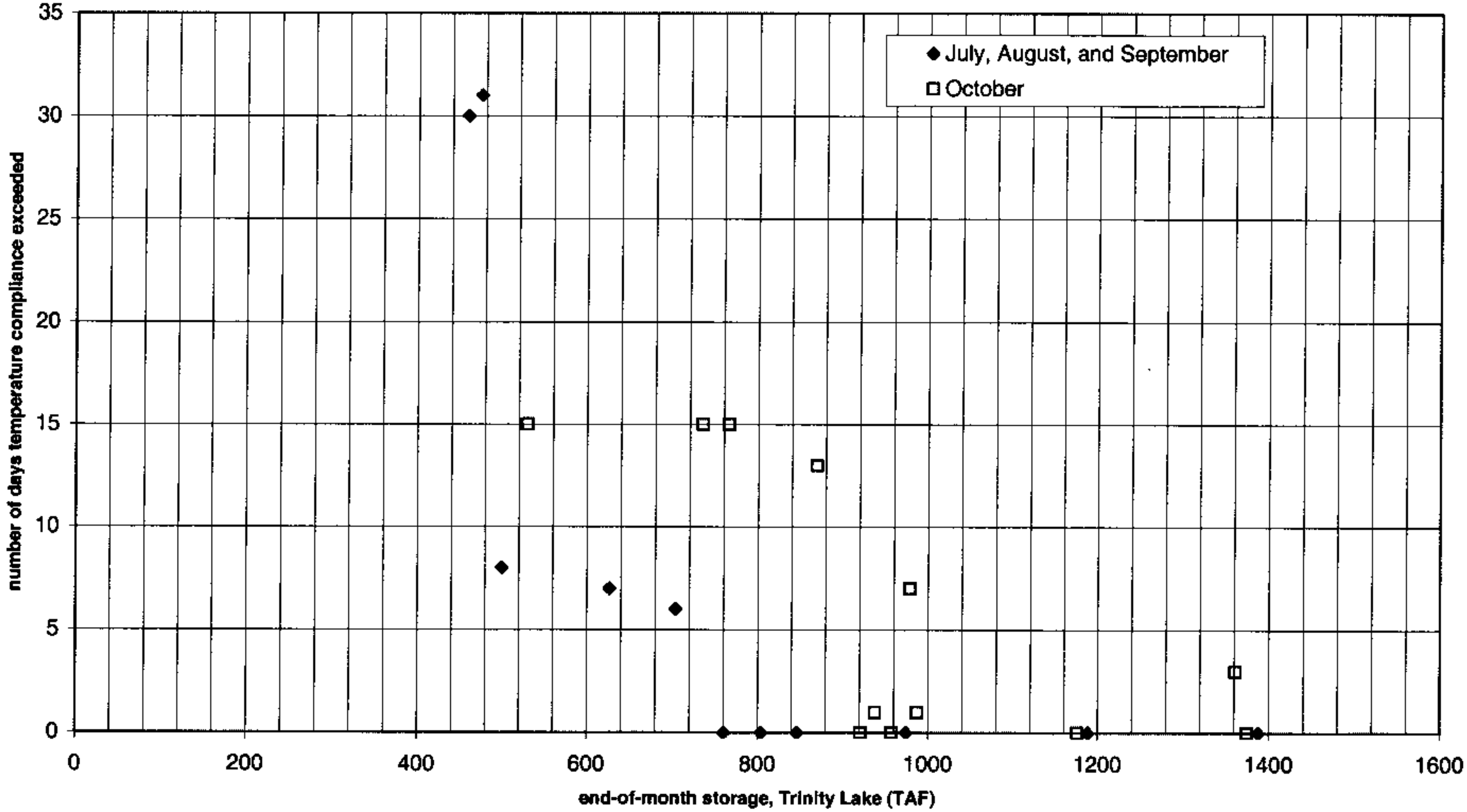
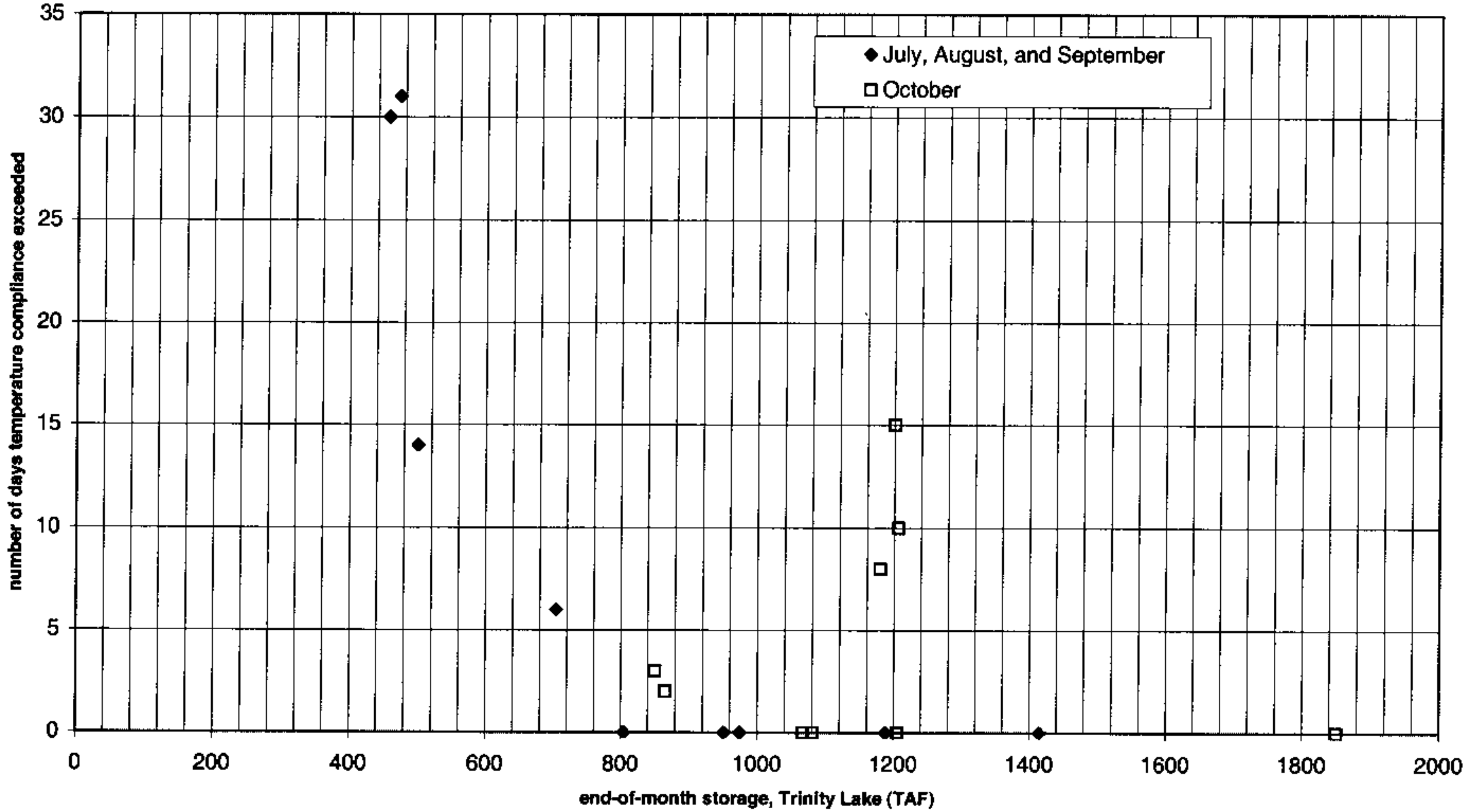


FIGURE 2

Comparison of End-of-Month Storage to Temperature Compliance:
(Existing Conditions-No Action Alternatives)
extremely wet through critically dry water year-types



Power Analysis

Several reviewers expressed concerns with the adequacy of the impacts analysis of Central Valley Project (CVP) power resources in the DEIS/EIR. Of particular concern were the cost estimates included in the analysis. This thematic response addresses these concerns and discusses some of the key assumptions made, as well as their sensitivity with regard to influencing the results. Economic impacts to Western Area Power Authority's (Western) First Preference power customers, which were not specifically identified in the DEIS/EIR, are also addressed. The additional analyses presented below confirm that economic impacts associated with some of the alternatives with regard to decreased CVP power generation (and associated assumed air quality impacts given additional use of fossil-fuel-based power generation facilities) would be potentially significant as identified in the DEIS/EIR. Such impacts were very conservatively estimated in the DEIS/EIR, given that the construction of any new fossil-fuel-based generating facility would be subject to air quality permitting requirements that would likely result in no net emissions within the particular region. Further, it should be noted that Western acts as a provider of wholesale electricity. Individual wholesale customers maintain responsibility for maintaining a prudent resource mix and encouraging efficient use of its electrical supplies. In summary, the economic costs discussed below may be greater (or less) than costs identified in the DEIS/EIR given different assumptions, which are in part driven by the continued uncertainty related to market deregulation and gas price fluctuations, but the relative impacts identified in the DEIS/EIR remain unchanged and significant.

CVP Generation in Relation to Total California Generation and Demand.

California's annual energy demand in 1998 was approximately 250,000 gigawatt-hours (GWh) (California Energy Commission, 2000). Demand for energy is projected to grow at approximately 2.0 percent annually between 2000 and 2010, resulting in a projected demand of 320,000 GWh in 2010. Peak demand in California typically occurs in late afternoons during the month of August in response to a string of days with high-temperatures (California Energy Commission, 1999). California's peak demand in 1999 was approximately 51,000 MW and is projected to grow at approximately 1.7 percent annually between 2000 and 2010, resulting in a peak demand of 61,000 MW in 2010. In comparison, total installed capacity of CVP generation is approximately 2,000 MW, although actual capacity is typically less. Actual capacity is less than installed capacity because hydrologic variation and competing uses such as water delivery and environmental requirements reduce the ability of the generators to operate at maximum capacity. The total installed CVP generation capacity of 2,000 MW equates to 4 percent of California demand in 1999, and 3 percent of projected 2010 demand. The TRD accounts for 25 percent (approximately 500 MW) of CVP installed capacity, which equates to approximately 1 percent of current California demand, and less than 1 percent of projected 2010 demand.

Currently, according to the Western Systems Coordinating Council, approximately 3,700 MW (which represents more than the total generation capability of the entire CVP) of new powerplants (six individual projects in total) in California are either under construction or have gained full regulatory approval. Approximately 7,500 MW of new powerplants (15 projects) have applications under review, and another 2,000 MW of new powerplants (three projects) have begun the application process. The majority of pending and proposed powerplants are natural gas-fired turbines, and a small minority (approximately 100 MW) would be either wind or geothermal powered. All of these powerplants have an anticipated "on-line" date prior to June 2004. Recent demand growth has outstripped current available capacity, leading to several statewide alerts regarding insufficient reserves of available capacity. Completion of additional powerplants is anticipated to help avoid such alerts in the future. Construction of additional generating capacity is taking place, and will continue to take place, independent of any decision regarding the Trinity River Mainstem Fishery Restoration.

A detailed assessment regarding the impact of CVP power supplies on the greater California region was not conducted for the DEIS/EIR, other than what is presented in the Socioeconomics section. It is anticipated that as demand for power increases, additional power supplies will be built to meet the increase in total California demand. As this occurs, the CVP's current total contribution of meeting 4 or less percent of total California electrical demand will constitute a decreasing proportion of the state's overall power generation supply.

Cost of Western Power

Western maintains contracts with "Preference" customers and "First Preference" customers for sale of surplus power. Preference customers are defined as entities eligible to receive power pursuant to the Reclamation Act of 1939 (non-profit organizations financed through the Rural Electrification Act of 1936, municipalities, and public agencies). First Preference customers are a subset of Preference power customers within a county of origin as specified under the Trinity River Division Act of 1955 and the New Melones Act of the Flood Control Act of 1962. By law, 25 percent of the power attributed to the Trinity River Division (TRD) of the CVP must first be offered to Preference customers in Trinity County, and up to 25 percent of the power attributed to the New Melones project must first be offered to Preference customers in Tuolumne and Calaveras Counties. Surplus power is defined as power that exceeds the capacity and energy required to operate the CVP facilities (Project Use). Western could market power to private industries or utilities if surpluses exist in excess of Preference customer demands. Currently, Preference customers' demands consume all of the power marketed by Western; therefore, no surpluses exist, nor are surpluses expected to exist in the foreseeable future. These private industries and utilities are potential "customers" that would not have Preference status nor supplies guaranteed by contract; furthermore, none currently exist, and are therefore not included in the analysis.

For the DEIS/EIR, impacts to CVP Preference power customers were estimated using a two-step process. First, given that Western's operating costs (e.g., payment on facilities, interest on debt) would not change, changes in power output were assumed to result in a change in the per-unit cost of electricity. Consider a very simple example:

> If Western's operational costs are $100 per year and it markets 10,000 kilowatt hours (kWh) of CVP electricity, the cost would be $0.01/ kWh ($100/ 10,000 kWh). If CVP generation available to Western is reduced to 5,000 kWh, the cost would be $0.02/ kWh.

The second step in the process was to estimate the cost (or benefit) to CVP Preference power customers of the change in electricity production. This second step values changes in capacity and energy. It assumes that CVP Preference power customers use cheaper sources of power first, and then add more expensive sources as needed. Continuing the above example:

> If Western had only one customer, and that customer had a total electricity requirement of 10,000 kWh, then the customer would be impacted twice by the reduction in CVP generation noted above. First, instead of paying $0.01/ kWh for CVP power, the customer will now pay $0.02/ kWh, but the total payment remains $100. The second impact on the customer is the shortfall in electrical supply. The customer will have to purchase an additional 5,000 kWh from the market to make up for the reduction in CVP generation. If 5,000 kWh of replacement power is available at $0.05/ kWh, then the total impact to the customer would be the additional cost of electricity $250, ($0.05 x 5,000 kWh), resulting in a blended cost of $0.035/ kWh (($100+$250)/ 10,000 kWh) and a total impact, or rate increase, of $0.025/ kWh ($0.035/ kWh – $0.01/ kWh).

Therefore, in the above example, the CVP Preference power customer is (1) paying more per unit for less electricity from Western, and (2) making up for a shortfall by purchasing more expensive electricity from the market. In actuality, Western serves a wide range of customers that each have unique electrical demands and use CVP power for differing proportions of their total power supply. Thus, because value varies both seasonally and daily, a reduction in generation may not equate to a reduction in value if generation occurs more often in high-value periods (i.e., on-peak summer). Further, the net amount of electricity available for Western to market to its customers is affected by the amount of power required by the CVP to operate ("Project Use").

As an example, consider the impacts associated with the Flow Evaluation and Percent Inflow Alternatives. On average, Flow Evaluation would export less water to the Central Valley than Percent Inflow (630,000 acre-feet versus 730,000 acre-feet). However, generation under the Flow Evaluation occurs more often in the summer months, and Project Use decreases due to the reduction in water available. Accordingly, the cost of replacement electricity under Flow Evaluation is less than under Percent Inflow ($5,564,000/ year under Flow Evaluation versus $7,023,000/ year under Percent Inflow). Clearly, commentors relying solely on estimates of power impacts based on acre-foot reductions would miss the nuances of the analysis.

Key Assumptions

The analysis in the DEIS/ EIR built off of these assumptions by considering the seasonal nature of hydropower generation as modeled by U.S. Bureau of Reclamation's (Reclamation) PRoject SImulation Model (PROSIM) (typically more generation during high-

runoff months in winter/spring) and the daily fluctuations between high demand hours (on-peak) and low demand hours (off-peak). The DEIS/EIR also differentiated between the value of instantaneous ability to meet load (capacity or capability, typically measured in Megawatts [MW]) and generation over time, energy, typically measured in Gigawatt hours [GWh]).

The PROSYM model, which was used by Western, has been used in a number of other planning efforts including preparation of the Central Valley Project Improvement Act Programmatic EIS (CVPIA PEIS) and Western's 2004 Power Marketing Program EIS. For the DEIS/EIR, PROSYM dispatched the electrical generation output of PROSIM into a regional power grid based on the total load of the Northern California Preference power customers. Generally, in the future, power operations on the CVP will be managed to meet Northern California Preference power customers. For valuation purposes, electrical generation was evaluated as firm capacity (called capability in the DEIS/EIR), non-firm capacity (sometimes called "spinning reserve") and energy generated during higher-value (on-peak) and lower-value (off-peak) periods.

Dollar values were assigned to replacement energy based on the assumption that natural gas-fired combined-cycle combustion turbines would likely replace decreases in hydro-power energy production. The cost of electricity from these turbines was estimated by combining the capital cost of building new turbines with the operational cost of fueling them with natural gas and the transmission cost of delivering electricity to the customer, and as such represents a conservative estimate. All of these assumptions are outlined in Attachment F1 of Power Resources Technical Appendix F of the DEIS/EIR. In practice, replacement power could be produced by a mix of power resources. However, each CVP Preference customer is unique in terms of its load characteristics, and the appropriate mix would vary from customer to customer.

General Concerns with the Analysis

Reviewers noted that the cost estimates presented in the DEIS/EIR were not reflective of CVP Preference power customer's current costs. The power analysis in the DEIS/EIR was actually not intended to present actual costs, but rather representative costs that would allow for assessment of the relative impact of the alternatives. Using the replacement cost methodology outlined above, each alternative was assigned a value relative to No Action. For example, an annual additional replacement cost of $5,564,000 (compared to the No Action Alternative) was identified for the Flow Evaluation Alternative in the DEIS/EIR. This represents the change in total annual cost to Preference power customers compared to No Action.

Reviewers suggested that the cost estimates for each alternative were not realistic, and that costs for individual customers were under-reported. Part of this confusion was derived from the use of power costs for economic analysis elsewhere in the DEIS/EIR. To facilitate economic analysis, relative values for each alternative were separated by county according to each county's share of CVP capacity, defined by CVP Preference power customer's Contract Rate of Delivery (CRD). CRD is a commonly used measure of each CVP Preference power customer's relative share of CVP power, largely because the CRD amounts are not disputed. In several counties, however, there is only one Preference power customer (e.g.,

Trinity Public Utility District [PUD] in Trinity County and City of Redding in Shasta County). These customers in particular noted that the reported costs were not consistent with their independent analysis of the alternatives.

First, it should be emphasized that the separation of costs by counties was done to approximate additional costs by region. When considered regionally (e.g., San Joaquin Valley, Sacramento Valley, Bay Area), the aggregated capacity values are a reasonable measure of power usage across the state. However, when taken individually (especially where there is a single CVP Preference power customer per county) the values may not be representative of an individual customer's cost experience, nor were they intended to be. Instead, the relative values were meant to be used as a comparison between alternatives to determine the significance of changes in CVP generation. The analysis in the DEIS/EIR was not only sufficient for this purpose, but it was a conservative assessment of the environmental effects (potential degradation of air quality) brought about by changes in hydropower generation.

However, to respond to comments, this thematic response provides a supplemental analysis of costs per county separated by each county's share of CVP energy (based on average No Action condition). Although this will not exactly replicate each Preference power customer's costs, it more closely approximates individual customer's experience because energy includes a measure of duration of use, rather than magnitude of use (Megawatt hours [MWh] versus Megawatts [MW]).

Table 1 presents a comparison of the two methods of analysis—allocation by county based on energy (supplemental analysis), versus allocation based on capacity (which was the approach taken in the DEIS/EIR). Table 2 presents a re-allocation of costs per county based on relative share of energy purchased from Western. It should be noted that the total impact of each alternative remains unchanged, but the allocation of costs does vary, with more emphasis on duration of use rather than magnitude of use. Table 2 also includes special consideration of First Preference customers, explained in detail below.

Reviewers also expressed concerns regarding costs to end users (i.e., individual households and businesses), especially those in low-income communities that might be disproportionately affected by increased power costs. Impacts to a CVP Preference power customer's end user is a function of how a Preference power customer sets its retail rates and how much electricity is consumed by an individual end user. Given the wide diversity in the rate structures of Western's customers, it is not feasible to calculate an individual end-user rate impact. Instead, the refined analysis (allocating costs based on energy rather than capacity) presented in Table 2 provides cost estimates that more closely approximate Preference power customer costs and therefore will more closely resemble the magnitude of impact preference customers will experience.

TABLE 1
Comparison of Cost Allocation by Energy Versus Cost Allocation by Capacity

	Supplemental Analysis		Original DEIS/EIR Analysis	
County	Energy Use[a] (No Action) (MWh)	Percent of CVP Energy Used by County %	Capacity Available [b] (No Action) (MW)	Percent of CVP Capacity Available for Use by County (%)
Alameda	409,846	6.26	59.6	4.08
Butte	17,953	0.27	11.4	0.78
Calaveras	21,380	0.33	8.4	0.57
Contra Costa	16,340	0.25	6.8	0.46
Fresno	27,257	0.42	7.7	0.53
Glenn	9,081	0.14	4.1	0.28
Kern	134,767	2.06	33.0	2.26
Kings	80,694	1.23	18.7	1.28
Lassen	128,631	1.97	3.0	0.21
Mendocino	30,079	0.46	8.8	0.60
Merced	69,362	1.06	6.7	0.46
Placer	278,721	4.26	69.0	4.72
Plumas	58,655	0.90	22.5	1.54
Sacramento	2,261,839	34.57	381.4	26.10
San Francisco	-	0.00	-	0.00
San Joaquin	129,595	1.98	36.0	2.47
Santa Barbara	21,671	0.33	5.2	0.36
Santa Clara	1,680,377	25.68	522.4	35.76
Shasta	525,607	8.03	127.5	8.72
Solano	138,440	2.12	33.9	2.32
Sonoma	37,711	0.58	4.7	0.32
Stanislaus	76,542	1.17	21.9	1.50
Trinity	78,440	1.20	18.0	1.23
Tulare	13,638	0.21	4.0	0.27
Tuolomne	35,378	0.54	8.8	0.60
Yolo	146,134	2.23	16.2	1.11
Yuba	114,245	1.75	21.6	1.48
Total	**6,542,383**	**100.00**	**1461**	**100.00**

[a] Energy is the amount of CVP-generated electricity available for use by customers, after accounting for Project use.
[b] Based on contract rate of delivery.

TABLE 2
Supplemental Benefits (or Costs) of Changes in Power Production ($1,000) Allocated by County Based on Energy Use

County	No Action CVP Energy Use (MWh)	Percent of County Use (%)	State Permit ($1,000)	Maximum Flow ($1,000)	Percent Inflow ($1,000)	Flow Evaluation ($1,000)
Alameda	409,846	6.26	371	(1,617)	(442)	(344)
Butte	17,953	0.27	16	(71)	(19)	(15)
Calaveras	21,380	0.33	22	(124)	(17)	(29)
Contra Costa	16,340	0.25	15	(64)	(18)	(14)
Fresno	27,257	0.42	25	(108)	(29)	(23)
Glenn	9,081	0.14	8	(36)	(10)	(8)
Kern	134,767	2.06	122	(532)	(145)	(113)
Kings	80,694	1.23	73	(318)	(87)	(68)
Lassen	128,631	1.97	116	(507)	(139)	(108)
Mendocino	30,079	0.46	27	(119)	(32)	(25)
Merced	69,362	1.06	63	(274)	(75)	(58)
Placer	278,721	4.26	252	(1,099)	(301)	(234)
Plumas	58,655	0.90	53	(231)	(63)	(49)
Sacramento	2,261,839	34.57	2,048	(8,922)	(2,439)	(1,901)
San Francisco	-	0.00	-	-	-	-
San Joaquin	129,595	1.98	117	(511)	(140)	(109)
Santa Barbara	21,671	0.33	20	(85)	(23)	(18)
Santa Clara	1,680,377	25.68	1,522	(6,628)	(1,812)	(1,412)
Shasta	525,607	8.03	476	(2,073)	(567)	(442)
Solano	138,440	2.12	125	(546)	(149)	(116)
Sonoma	37,711	0.58	34	(149)	(41)	(32)
Stanislaus	76,542	1.17	69	(302)	(83)	(64)
Trinity	78,440	1.20	79	(455)	(64)	(107)
Tulare	13,638	0.21	12	(54)	(15)	(11)
Tuolomne	35,378	0.54	34	(184)	(32)	(42)
Yolo	146,134	2.23	132	(576)	(158)	(123)
Yuba	114,245	1.75	103	(451)	(123)	(96)
Total	**6,542,383**		**5,937**	**(26,036)**	**(7,023)**	**(5,564)**

Reviewers also questioned the validity of assumptions used to value electricity in the future given the use of gas price forecasts and the evolution of the deregulated electrical market. The new open market created by deregulation has been fluctuating greatly (including rapid fluctuations in the value of ancillary services such as “spinning reserves”), precluding any reasonable forecasts for future prices. It has been assumed that the market will mature and become more predictable over time, but at this time, forecasts of long-run market prices are considered speculative. Accordingly, estimates of absolute dollar impacts provided by commentors may be correct, overstated, or understated. At this time, estimates of replacement power cost provided from the market are difficult to predict when the power market would presumably be more mature.

At the time of the DEIS/EIR analysis, the new deregulated market structure had been in place for a relatively short time, and it was difficult to clearly determine how capacity shortages would be reflected in an hourly energy market (i.e., the California Power Exchange [Cal PX] and the California Independent System Operator [CAISO]). The DEIS/EIR analysis assumed that the combination of energy and capacity values assigned to the generation characteristics of the alternatives would be representative of market pricing once the market achieves balance between load and capacity. The California energy market is still adjusting to deregulation, precluding use of a new methodology.

Reviewers specifically questioned the use of gas price forecasts used in the analysis. Gas prices have also been subject to wide fluctuations recently, and it is not clear when (or if) they will stabilize. Gas prices used in the DEIS/EIR analysis were approximately $2.24 to $2.27/MMBtu at the generator. Recent wellhead prices for gas during January varied from $2.08 to $2.50/MMBtu. Adding in the typical wheeling charges results in a delivered price in the range of $2.40 to $2.90/MMBtu. A comparison of the DEIS/EIR average annual price used in the analysis and the current (winter) prices indicate that overall there has not been a major deviation from the pricing used in the analysis. Further, even if there were a large deviation in gas prices, the relative impact of the alternatives would not change in comparison to No Action. Table 2 was developed using the same gas prices used in the DEIS/EIR. Most recently, gas prices have been spiking in the range of $4.00/MMBtu.

It is also important to note that gas prices are a component of the analysis, but do not account for the entire cost of replacement electricity. Replacement costs are calculated by assuming that replacement capacity would be supplied by new natural-gas fired turbines. Capacity price is based on the capital cost of constructing new facilities. Energy costs are based on the cost of operating the facility, largely the cost of supplying natural gas to the facility. Revised gas prices would affect the magnitude of the impacts, but because gas prices would also affect the No Action and Existing Condition simulations, the relative impact would remain approximately the same.

The approach used in the DEIS/EIR was determined to be a reasonable method for evaluating impacts, and was based on the best available data at the time of analysis. Given recent (and likely continued) market and gas price fluctuation, the replacement cost approach remains valid, although input cost assumptions and forecasts will change over time. There are other approaches that may also be reasonable (some of which were noted by commentors) that yield slightly different values, although these would likely result in similar relative impacts for the scope of analysis.

Individual power customers may be able to assess different impacts to their individual operations. However, in so doing, it is important to include monthly as well as annual changes between the alternatives, because some changes occur in the timing of generation, which also affects value of generation, and therefore impacts to customers. However, because of the wide diversity in the operations of individual customers, it is not feasible to estimate customer impacts for every Western customer affected by the proposed action. Instead, impacts to representative customers are presented in the DEIS/EIR.

It is also important to note that energy and capacity were valued separately. As noted above, energy values were derived from the California market-clearing price for natural gas based on monthly on-peak and off-peak rates. Value of capacity was further separated into "capacity supported with energy" and "capacity without energy." Capacity with energy is a measure of the reliable capacity (given minimum flow requirements, etc.) of a hydropower resource in a given month. This is an important distinction because the PROSIM data used by PROSYM is in a monthly time-step, and downstream requirements can serve as constraints on available capacity. Unlike a gas-fired turbine, a hydroelectric facility cannot "order" more fuel when supplies run low. For a gas-fired plant, capacity with energy is not typically a concern because as long as there is fuel, the plant can operate. Capacity without energy is a measure of the capacity available for meeting instantaneous load, but not sustainable for an extended period of time. Capacity was valued at $8.99 per kW-month based on the cost of building combined-cycle turbines. Capacity without energy (also called reserves) was valued at 20 percent of that figure. As with the deregulated power market and natural gas prices, the value of ancillary service (capacity without energy) has also been fluctuating recently. Detailed assumptions are outlined in Power Resources Technical Appendix F of the DEIS/EIR.

First Preference Customers

Changes in available CVP power affect Western's CVP Preference power customer's differently, based on their respective allocation of CVP power. Trinity PUD is a First Preference customer, giving it special access to CVP power. First Preference customers are offered a percentage of the generation for a particular CVP generator, or set of generators, before the power is offered to other customers. Trinity PUD is eligible for up to 25 percent of the generation of the TRD. Currently, Trinity PUD uses approximately 8 percent of its full entitlement, and load forecasts through 2020 are not anticipated to increase significantly[1]. As long as Trinity PUD is using less than its full entitlement, it will not need to access outside sources of electricity to meet load requirements. In the simplified example above under "Cost of Western Power," impacts to Trinity PUD are limited to the first-step of the analysis as long as a reduction in Western supplies does not fall below Trinity PUD's load requirements. Table 3 presents the change in First Preference allocation to Trinity PUD under the alternatives.

Table 3 presents the change in First Preference allocation to Trinity PUD under the alternatives.

[1] Trinity PUD would need to increase its demand by approximately 300 percent to exceed its current First Preference allotment.

TABLE 3
Modeled Share of Energy Available to Trinity PUD (Average Annual GWh)

	No Action	Maximum Flow	Flow Evaluation	Percent Inflow	State Permit
Total Generation for TRD	1,524.4	552.7	1,257.9	1,374.8	1,740.3
Project Use Supplied by TRD	410.9	148.9	350.6	383.2	454.7
Net Energy Available from TRD	1,113.5	403.7	907.3	991.6	1,285.6
Trinity PUD Allocation (25 percent TRD)	278.4	100.9	226.8	247.9	321.4

In the DEIS/EIR, power impacts to Trinity County were separated out as part of a regional economic analysis. Power impacts did not account for Trinity PUD's First Preference status. A revised analysis specific to Trinity County and its First Preference status follows. The analysis is also relevant for other First Preference customers, which include the Caleveras Public Power Agency and Tuolumne Public Power Agency. Table 4 presents the change in the Western's basic rate that would result from implementation of the various alternatives. The incremental change in basic rate reflects the impact of the various alternatives. That is, the additional cost of electricity attributable to an alternative is the incremental increase in Western rates multiplied by the average energy use of a First Preference customer. Total costs changes are presented in Table 4 for each alternative. Under the Flow Evaluation, Trinity PUD would be subject to approximately $107,000 of additional cost per year compared to No Action. In the DEIS/EIR, this cost was reported as $69,000. The discrepancy results from Trinity PUD's individual load characteristics. It is not constrained by capacity; therefore, its costs are better reflected by energy usage.

TABLE 4
Impact on First Preference Power Customer

Alternative	Percent Change in CVP Available Energy	Western Rate ($/MWh)	Change Compared to No Action ($/MWh)	Percent Change
No Action	N/A	19.0	N/A	N/A
Maximum Flow	(24.4)	24.8	5.80	30.5%
Flow Evaluation	(6.7)	20.4	1.36	7.2%
Percent Inflow	(4.1)	19.8	0.82	4.3%
State Permit	5.6	18.0	(1.01)	-5.3%

CVPIA Restoration Fund and Repayment

Reviewers also raised questions about the impact of reduced power generation on the CVPIA Restoration Fund, both in terms of additional, unreported costs to power customers and as a threat to the continued viability of the Restoration Fund itself. The amount of CVPIA Restoration Fund surcharge paid by power customers is a function of actual water

deliveries made to the CVP water contractors. As water deliveries decrease, the surcharge paid by the CVP Preference power customers increases. The total cost of CVP power to Preference power customers would increase if the level of CVPIA Restoration Fund surcharges assigned to the power function increases. While this issue is certainly a major concern to CVP Preference power customers, as well as CVP water users in general, the lead agencies acknowledge the potential for such a scenario to occur, and note that it is beyond the scope of the environmental analysis in the EIS/EIR to attempt to further analyze its economic ramification in light of the wide range of uncertainties with the water sales market and other unknown economic variables associated with this issue. Congress and the Administration is in a continuing debate regarding collection and allocation of the Restoration Fund, increasing the uncertainty surrounding changes to the Restoration Fund. Water deliveries and power generation will be further affected by full implementation of CVPIA, the SWRCB water rights process, CALFED Bay-Delta Program, deregulation of the electrical industry, and other factors noted in Section 4.1 Cumulative Impacts in the DEIS/EIR. The interplay of these processes and organizations on water delivery and power is highly complex in light of the projected growth rates in California, and the impact on rates would be purely speculative.

Potential costs associated with repayment are addressed in the thematic response "Implementation Funding and Relationship to Repayment, Reimbursement, and the CVPIA Restoration Fund."

Description of the Proposed Action/Segmenting

Several reviewers asserted that the DEIS/EIR did not describe the Proposed Action, or some aspects of the Proposed Action, in sufficient detail, and that, as a result, the document did not disclose all impacts. These reviewers thus asserted that the lead agencies were guilty of project "segmenting" or "piecemealing."

The lead agencies disagree with such assertions. It is important to note that, for site-specific components of the Proposed Action (such as channel modifications and dam improvements required under certain alternatives), the DEIS/EIR is a programmatic document, and as such, assesses the overall impacts of implementing portions of the Trinity River Fishery Restoration Program. It is not appropriate or necessary to describe the site-specific details of activities (such as gravel replacement or riparian restoration) that will be tiered (40 CFR 1502.20 and 1508.28, CEQ Guidance Regarding NEPA Regulations at 48 FR 34263) from the programmatic document and receive environmental review on a site-specific basis at a later point in time. As identified in Section 2.1 Alternatives, page 2-21, 24 of the proposed 47 mechanical restoration projects associated with the Flow Evaluation, Percent Inflow, and Mechanical Restoration Alternatives would be built in the first three years, with the remainder built in following years. Each year projects would be evaluated, specific sites selected, and appropriate permits and authorizations acquired prior to initiating construction. Such an approach does not represent a lack of disclosure or deferral of mitigation, but constitutes logical, efficient, and appropriate planning.

There is nothing in either National Environmental Policy Act (NEPA) or California Environmental Quality Act (CEQA) that prohibits lead agencies from preparing documents that serve the dual function of providing project-level analysis for some aspects of a complex project or action and program-level analysis for other aspects. In fact, the practice this common method of dealing with projects or actions where only some aspects require later, more project-specific environmental review. Notably, the discussion of "tiering" within the NEPA Regulations adopted by the Council on Environmental Quality (CEQ) states that the tiering process allows agencies "to focus on the actual issues ripe for decision at each level of environmental review." (40 C.F.R. § 1502.20.) The CEQA Guidelines section on tiering contains similar language. (CEQA Guidelines § 15152(b).) This FEIS/EIR contains enough information for the federal lead agencies to approve a flow decision, but contains only generalized information on channel modification projects and other activities that will be necessary under certain alternatives. In other words, flow will be "ripe for decision" before site-specific channel modification projects will be. The DEIS/EIR recognizes that "second-tier" review will be necessary for individual channel modification projects and other site-specific actions and mitigation required only under certain alternatives.

This is not to say that the DEIS/EIR failed to address the impacts of channel modification projects and similar site-specific actions necessary for certain alternatives. The document identifies the kinds of impacts that such projects are likely to entail, while recognizing that additional, second-tier information must be generated before any site-specific approvals are

granted (see DEIS/EIR, page 1-23). This represents an efficient and sensible approach to analyzing a project as complex as the proposed flow decision. If the federal lead agencies were to approve a project alternative that did not involve channel modification or dam modifications, then any site-specific information contained in the DEIS/EIR would have been unnecessary to an informed decision. The DEIS/EIR contains enough general information about such individual projects to permit an informed decision on the overall flow decision, even while recognizing that additional site-specific analyses will be required before individual channel modification permits or other site-specific actions are approved.

The concepts of segmentation and piecemealing invoked by the reviewers refer to a disfavored approach to environmental review different from that taken here. In the classic segmentation case under NEPA, a federal agency splits an indivisible action or project into two or more pieces to minimize the environmental consequences of the overall project or action. For example, where a freeway is planned to connect points A and C, going through point B, segmentation may occur if the agency prepares two "Findings of No Significant Impact" (FONSI) for actions consisting of links between points A and B, and points B and C. Unless the connections between A and B, and B and C have "independent utility" in and of themselves, a violation of NEPA may have occurred.

In the classic piecemealing case under CEQA, an agency prepares two negative declarations for a single project consisting of several discretionary approvals. For example, one negative declaration is prepared for a general plan amendment and rezone, while another negative declaration is prepared for a tentative map or variance. Such an approach tends to minimize the overall effects of what should be an indivisible project requiring the various discretionary approvals. Another variety of piecemealing occurs where an agency plans a multi-stage project but fails to analyze the impacts of any phase but the first.

In short, the reviewers have confused the legitimate use of "tiering," as contemplated by the DEIS/EIR, with the different concepts of segmentation and piecemealing. Here, the DEIS/EIR addresses the impacts of channel modification and similar site-specific activities that would only be necessary under some alternatives, but does so in general terms, with a recognition that more site-specific information must be generated before actual permits or other approvals are granted. The DEIS/EIR has not simply avoided any mention or analysis of those later approvals. Nor have the lead agencies narrowly defined their project and action to avoid any mention or recognition of the channel modification projects and other similar site-specific activities.

Use of Water Delivery and Related Models

A number of reviewers expressed concerns with the use and interpretation of the water delivery and system operation models and results used to illustrate and project potential impacts associated with each alternative. As summarized in Section 3.1, Introduction of the DEIS/EIR, a number of predictive models were used to assist in projecting water deliveries and related effects on water quality and habitat for both aquatic and terrestrial species. A description of each model, key assumptions, and use are provided in each section where a given model is used, as well as the associated appendices. The majority of the models used in preparation of the DEIS/EIR were determined to be the best tool available given their use in other large-scale water management studies, including the Central Valley Project Improvement Act (CVPIA) Programmatic EIS (PEIS). The CVPIA PEIS process included an extensive review of potential analytical tools to select the most appropriate tools for the PEIS. An Analytical Tools Workshop was held to give the public an opportunity to provide input on the choice of tools for the PEIS analysis.

The many assumptions related to current and future projected CVP operations were the subject of numerous public stakeholder meetings across the state between 1993 and 1995 as part of the CVPIA PEIS process. (Also see thematic response titled “No Action Alternative/Existing Conditions Scenario and Range of Alternatives,” which discusses the primary assumptions made for the NEPA No Action and CEQA Existing Conditions scenarios). As stated in Section 3.3, Water Resources of the DEIS/EIR, other planning efforts of statewide importance where PROSIM (discussed below) and other models used in the DEIS/EIR were included are:

- CALFED
- Consolidated and Expanded Place of Use
- Interim Folsom Re-operation
- American River Water Resources Investigation
- American River Watershed Project
- Water Augmentation
- Water Forum Proposal EIR

The use of PROSIM and other predictive tools is a constant source of debate within the water community. However, these models represent the best tools available, as well as an accepted method of comparing potential actions and alternatives. In particular, the use of the models discussed below to assist in identifying Sacramento River temperature and salmon mortality effects is certainly reasonable given adaptations of these models are used for annual CVP operations by the Sacramento River Temperature Task Group. The Department of the Interior (DOI) believes that use of such models is appropriate and that to have created a wholly new approach, or to have analyzed impacts in an entirely qualitative fashion would have been inappropriate and subject to valid criticism. Absent any suggested better method, DOI believes the extensive modeling of potential impacts for a number of scenarios, including the simulated driest period of record (1928-1934, termed the “dry

period or condition") represents a worst-case analysis and is more than adequate for NEPA- and CEQA-related impact assessment.

Models and Their Use

The primary model used to assess projected changes in water deliveries and CVP and SWP operations was U.S. Bureau of Reclamation's (Reclamation) PROSIM model. PROSIM is a monthly planning model used to simulate CVP and SWP operations. The model identifies potential water supply impacts from changes in operational assumptions associated with a proposed project or action. Key simulation results from model runs include CVP and SWP reservoir levels; timing and magnitude of Delta inflows, outflows, and exports; and CVP and SWP deliveries. Given PROSIM is a planning model, results are not presented as "stand alone" output, but rather are used on a comparative basis between an alternative scenario and a base no action simulation. Differences in PROSIM results between alternative simulations are intended to illustrate general trends and interrelationships between system resources.

Simulations of future conditions are based on the assumption that the historic hydrology that was recorded from 1922-1990 is representative of the range of hydrology that may occur in the future. This period is consistent with the future projected 2020 level hydrology developed for DWR Bulletin 160-93 that provides the basis for future land use and water demands. DWR Bulletin 160-93 was the most up-to-date information available at the time the EIS/EIR was initiated. Additionally, DWR Bulletin 160-98, which is the most recent DWR Bulletin and was released in 1998, used the same planning horizon (2020). Urban growth projections were actually reduced somewhat in Bulletin160-98, as such the use of Bulletin 160-93 projections provides a very conservative estimate of urban water demand. In an effort to not underestimate environmental effects, the lead agencies used the more conservative estimates from DWR Bulletin 160-93.

Particularly dry (1928-1934) and wet (1967-1971) periods from the historical record were analyzed separately to provide an indication of the impacts that would be projected to occur given a series of either particularly dry or wet years. Individual and series of years influence the associated carryover storage anticipated at each of the modeled system reservoirs, as well as the amount of water available for contract deliveries or environmental uses. Results of the modeling runs are presented in a number of places in the document, including Table 3-3 in Section 3.3 Water Resources, as well as within the text of Section 3.3 of the DEIS/EIR. The results of other models that use PROSIM output as input include:

- PROSYM (developed by Western Area Power Administration) for power-related impacts (Table 3-49, Section 3-10, Power Resources of the DEIS/EIR)
- Central Valley Production Model ("CVPM" developed by the California Department of Water Resources [DWR]) for agricultural-related impacts (Table 3-45, Section 3.9, Land Use of the DEIS/EIR)
- Central Valley Groundwater and Surface Water Model ("CVGSM" developed by Reclamation, DWR, and the State Water Resources Control Board [SWRCB]) for groundwater-related impacts (Figures 3-22 through 3-31, Section 3.3.2, Groundwater of the DEIS/EIR)

- Sacramento River Salmon Mortality Model ("LSALMON2" developed by Reclamation) for Sacramento River salmon-related impacts (Table 3-15, Section 3.5, Fishery Resources of the DEIS/EIR)
- Sacramento River Basin Temperature Model ("LSACTEM3" developed by Reclamation) for Sacramento River temperature-related impacts [Table 3-9, Section 3.4, Water Quality of the DEIS/EIR]
- Delta Simulation Model (developed by DWR) for Bay-Delta water quality-related impacts (pages 3-141 through 3-148, Section 3.4, Water Quality of the DEIS/EIR)

The actual running of the model requires a number of iterative steps to ensure that the simulation results are consistent with assumed operational constraints. Operational constraints include carryover storage requirements, Delta water quality standards, and timing of releases from CVP and SWP facilities. The primary assumptions included in the No Action Alternative and Existing Conditions scenarios are addressed in the thematic response titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives." As discussed in the thematic responses referenced above, and as clearly described on page 2-7 of the DEIS/EIR, fundamental assumptions used in the PROSIM modeling effort included meeting the flow and reservoir storage requirements of the 1993 Winter-run Biological Opinion (BO), the 1995 delta smelt BO, and the 1995 Bay/Delta Accord. These requirements are incorporated into the operating logic the model uses to simulate the CVP, in addition to all other agricultural, M&I, and environmental contracts and entitlements.

Subsequent to the modeling analyses conducted for the Draft EIS/EIR, the California Court of Appeal for the Third Appellate District struck down a portion of the Monterey Agreement signed by the Department of Water Resources and State Water Project (SWP) contractors in 1994. The agreement amendments changed the prior method of allocating water supply deficiencies, which reduced supplies to agricultural contractors before those to urban contractors were cut. The No Action and all other Trinity alternatives assume the Monterey Agreement is in place, and SWP supplies are allocated among agricultural and municipal and industrial (M&I) contractors evenly in proportion to their entitlement. The Monterey Agreement, as simulated in the No Action Alternative, has no effect on the level of SWP delivery, rather it only affects the delivery allocation to contractors south of the Delta once an overall delivery level has been determined. Therefore, the Monterey Agreement does not have any impact on the amount of water the SWP exports from the Delta. The amount of water exported is a function of demand, available supply, and export restrictions.

Accordingly, it is not anticipated that this court decision will have any significant impact on the results of the modeling analyses conducted for the Draft EIS/EIR.

Presentation of Results and Use of Data

A number of comments were received that questioned the presentation of results and suggested that a number of potential impacts were masked by "averaging." As described above, the quantitative analysis of anticipated system operations and associated water deliveries and effects on water quality and habitat were presented for dry- and wet-year conditions as well as an average over the simulation period. Contrary to the reviewers'

assertions, this approach allows readers to see potential impacts in the context of three conditions, only one of which represents an average over the entire period. For some issue/resource areas, such as Section 3.9.2, Agriculture of the DEIS/EIR, only the dry and average period are included because under the wet condition, no impacts were found to occur (essentially during "wet" periods, there is an adequate quantity of water supply to meet all system demands). The dry period represents a worst-case scenario and as such meets the intent of both CEQA and NEPA.

In addition to the anticipated dry-period impacts, other sections of the document present simulated frequency curves to show the projected impacts of each alternative compared to No Action and the Existing Conditions scenario over the entire simulation period. Figures 3-16 through 3-20 of the DEIS/EIR identify the frequency of flows, reservoir storage (Shasta, Trinity, and Folsom), and water deliveries to various water service contractors north and south of the Delta. As shown on Figure 3-15 "How to Read a Frequency Distribution Curve," these figures present information in terms of the percent exceedance for a particular attribute (e.g., acre-feet of storage, or total water deliveries). This same approach is presented in Section 4.1.14 Cumulative Impacts Analysis to show impacts over the entire simulation period. This approach is consistent with the approach used in the CVPIA PEIS, and as such was determined to be a familiar method of presentation for stakeholders who participated in the development of that document and also commented on this DEIS/EIR.

Potential water quality and fishery impacts within the Sacramento River and the Bay-Delta were evaluated by reviewing simulated annual losses associated with each alternative over the simulation period. These numbers were not averaged, but rather reviewed as individual years, as illustrated on page 3-175 of the DEIS/EIR, which shows impacts to various runs of chinook salmon during the simulated dry years of 1924, 1931 through 1935, and 1977. Moreover, impacts to fall, winter, and spring chinook salmon were conservatively identified as significant under CEQA, given at the time the DEIS/EIR was released the results of Endangered Species Act (ESA) consultation were not yet known. Other reviewers, such as the California Department of Fish and Game (CDFG), who have regulatory authority over state-listed species suggested that such a modeled impact was **not** significant. The identification of this impact as significant again illustrates that the DEIS/EIR consistently evaluated impacts in a worst-case manner.

Cumulative Impacts Analysis

A number of reviewers asserted that the cumulative effects analysis was not inclusive enough or did not adequately disclose impacts. The lead agencies disagree with these assertions.

The cumulative effects analysis was developed as a means of arriving at a better decision rather than as an academic exercise in developing a perfect cumulative effects analysis (*Considering Cumulative Effects Under the National Environmental Policy Act*, Council on Environmental Quality, January 1997). For a cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully. Thus, the DEIS/EIR team assessed reasonably foreseeable events within reasonably foreseeable geographic (spatial) and temporal boundaries to present a meaningful impact analysis rather than present an entirely specious, speculative analysis, which could lead to erroneous conclusions. The lead agencies believe the cumulative impact analysis represents a reasonable projection of future conditions including all relevant and foreseeable past, current, and future actions in addition to the proposed action.

Several reviewers suggested other factors be included in the cumulative effects analysis. In response to these comments, Chapter 2 of the FEIS/EIR, Changes to the DEIS/EIR, includes additional quantitative analyses with regard to power resources, M&I land use, water quality, and fishery resources. These analyses simply reinforce the conclusions reached in the DEIS/EIR that impacts to these resources/issue areas would be potentially significant. Other issue areas or suggested analyses that were not conducted were determined to be either too speculative or vaguely defined to allow for any meaningful analysis. Speculating on the level of activity and effects that may occur due to unknown, uncertain, or undefined activities is clearly inappropriate in attempting to provide a meaningful report as the basis for a decision.

Some reviewers suggested that a full analysis of the potential cumulative impacts of maintaining Trinity Reservoir storage at 600,000 acre-feet (af) should be completed. As described in Section 4.1.14 Cumulative Impacts Analysis, a future cumulative condition was modeled to include the Preferred Alternative, all provisions of the Central Valley Project Improvement Act (CVPIA) as they were addressed in the CVPIA Programmatic Environmental Impact Statement (PEIS), and full allocation of all CVP contracts (i.e., assume all contracted water allocations are fully utilized by all contract holders). Given these assumptions, and as stated on page 4-14 of the DEIS/EIR, the modeling effort revealed that simulated storage levels in Shasta Reservoir would be below feasible operating levels during the simulated dry period (1928 through 1934) analyzed throughout the document as well as one other critically dry year (1924).

The modeling effort assumed that a condition where Shasta was essentially inoperable would not be considered acceptable given U.S. Bureau of Reclamation would be unable to meet flow requirements related to the biological opinions (BO) for both the winter-run chinook salmon and the delta smelt, 1995 Bay/Delta Accord, as well as agricultural and M&I water deliveries. Consequently, the carryover storage requirement was reduced to

400,000 af to account for the dry years identified above. The DEIS/EIR states on page 4-14 that impacts associated with the 600,000 af carryover storage scenario would be greater. Indeed, the DEIS/EIR makes quite clear that the collective impact of CVPIA, full contract allocations, and the Preferred Alternative is projected to result in severe operational constraints and associated significant impacts. To further model such impacts, and attempt to model a condition where additional actions would be taken, such as decreasing deliveries to water-rights holders in violation of their existing contracts, was considered much too speculative and thus inappropriate. Accordingly, the project description has been revised in Chapter 2 of the FEIS/EIR, Changes to the DEIS/EIR, to state that a carryover storage level of 400,000 would be maintained associated with the Flow Evaluation and Preferred Alternatives in particularly dry years if deemed necessary to avoid infeasible operations at Shasta Dam.

It is also important to note that, while outside the scope of this document, many agencies and organizations are examining ways to increase water supplies as part of overall water management systems in the Trinity Basin and Central Valley Project.

Significance Criteria

The National Environmental Policy Act (NEPA) does not require the use of significance thresholds. The significance thresholds found in the DEIS/EIR reflect recent changes in the California Environmental Quality Act (CEQA). Because CEQA requires the feasible mitigation of all significant effects on the environment, it is commonly believed that EIRs must include "thresholds" that identify a level of impact that is "significant." In October 1998, the California Resources Agency issued a new version of its sample "Initial Study Checklist" (it is now found in Appendix G to the CEQA Guidelines). Trinity County relied heavily on Appendix G in formulating the significance thresholds found in the DEIS/EIR. As former Resources Agency General Counsel Maureen Gorsen has explained, Appendix G reflects "federal, state and local laws and regulations containing precise qualitative and quantitative standards that are commonly used thresholds in practice. In addition to providing more clear criteria to lead agencies in determining the significance of particular impacts, the new checklist integrates references to the numerous statutes dealing with specific environmental impacts (e.g., California Endangered Species Act) and standards developed by numerous regulatory bodies focused on particular environmental problems (e.g., San Francisco Bay Conservation and Development Commission, South Coast Air Quality Management District) in dealing with environmental impacts to certain important resources. In so doing, the Guidelines achieve the important statutory goal of integrating the requirements of CEQA with the environmental requirements of other laws."

As noted above, the significance thresholds used throughout the DEIS/EIR are based primarily on Appendix G, but they also reflect CEQA Guideline Section 15065 (mandatory findings of significance) and other accepted sources of professional and regulatory judgment regarding what constitutes significant levels of impacts on various environmental and natural resources. Even if the County has employed differing thresholds in the past, that fact would not bind that agency to continue using the same thresholds indefinitely. This document was prepared with the intent of employing up-to-date significance thresholds derived from CEQA. In any event, the significance thresholds, prepared for CEQA compliance purposes, should be understood to derive from Trinity County, rather than the lead agencies, and are not intended to be applicable to the legal requirements of either U.S. Fish and Wildlife Service (Service), National Marine Fisheries Service (NMFS), or U.S. Bureau of Reclamation (Reclamation) under federal law.

Accordingly, the identification of modeled impacts to listed aquatic and terrestrial species as significant in the DEIS/EIR per CEQA, even after mitigation, does not obligate the Service or NMFS to conclude that such impacts would adversely affect listed species under Endangered Species Act (ESA). The Biological Opinions (under separate cover) prepared by the Service and NMFS specify the anticipated affect of implementing the Preferred Alternative, as well as reasonable and prudent measures that will minimize the effects of incidental take of listed species.

Reference

Gorsen. 1998. "The New and Improved CEQA Guidelines Revisions: Important Guidance for Controversial Issues." Appendix 6 in Remy et al. Guide to the California Environmental Quality Act (10th ed. 1999). Page 971. October.

Tribal Trust

As stated in the Purpose and Need Statement, page 1-4 of the DEIS/EIR, one of the needs for this action "results from Congress'… (4) confirmation of the federal trust responsibility to protect tribal fishery resources affected by the TRD…" Accordingly, the Preferred Alternative is intended to address part of "…the federal government's tribal trust responsibility to protect the fishery resources of the region's Indian tribes" (see page 3-205 of the DEIS/EIR). See Section 3.6 of the DEIS/EIR for further details.

Tribal Participation in the EIS Process

"Due to the unique federal/ tribal relationship, and because of the prominent role the Hoopa Valley Tribe plays in Trinity River issues, the tribe serves as a co-lead for NEPA purposes. In addition, the Karuk and Yurok tribes have been active in developing the DEIS/ EIR" (see page 5-1 of the DEIS/ EIR). Several public meetings were held in and near Hoopa to seek input from the Native American community on the DEIS/ EIR effort. See page 1-22 of the DEIS/ EIR for further details. Tribal representation will continue to be sought on all current and future aspects of the restoration effort in the Trinity River.

Public Trust

Some commentors requested that the Final EIS/EIR contain a section that describes the responsibility of the U.S. Bureau of Reclamation (Reclamation) to protect the natural resources of the Trinity River under the State of California's public trust doctrine. The commentors state that the State's laws establish an ongoing trust duty to account for impacts of water allocations on public resources whenever feasible.

To our knowledge, application of the public trust doctrine to the operations of a federal reclamation project would be one of first impression, and thus, we do not believe it would be appropriate to include a section in the final document attempting to define conclusively these unresolved legal issues. As a general rule, Reclamation projects must operate consistent with state laws regarding the control, appropriation, use, or distribution of water used in irrigation, pursuant to Section 8 of the 1902 Reclamation Act, unless doing so would be contrary to federal law. Under the Mono Lake decision, National Audubon Society v. Superior Court of Alpine County, 658 P.2d 709 (Cal. 1983), the California Supreme Court held that the public trust doctrine, as recognized in California, imposes a duty of continuing supervision over the taking and use of appropriated water.

As described in the EIS/EIR, Congress on numerous occasions has addressed the issue of Trinity River Division (TRD) operations and the need to preserve and protect the fish and wildlife resources of the Trinity River. For example, the 1955 Act authorized the TRD as an integrated facility of the Central Valley Project, but also required the preservation and propagation of the Trinity River's fish and wildlife. This latter provision has been interpreted, in concert with the 1955 Act's legislative history, to require that only water that is surplus to the needs of the Trinity River be exported to the Central Valley. Construction and operation of the TRD, however, resulted in substantial impacts to the Trinity River fishery, primarily as a result of insufficient streamflows remaining in the Trinity River. This realization in the late 1970s led to the initiation of the Trinity River flow study by the Department of the Interior (DOI), as well as subsequent legislation from Congress directing the restoration of the Trinity River fishery to levels that pre-date the construction of the TRD so that tribal, sport, and ocean commercial fishermen could enjoy a sustainable fishery resource. Ultimately, the 1992 Central Valley Project Improvement Act called for the completion of DOI's flow study and the implementation of such recommendations, based on the best available scientific data, regarding necessary instream flows and appropriate TRD operations for the restoration and maintenance of the Trinity River fishery. Therefore, to the extent the State's public trust doctrine applies to the TRD, we believe that the Congressional mandates to restore and maintain the Trinity River fishery, and the resulting actions and decisions by DOI taken pursuant to these authorities, are fully consistent with the concepts of the State's public trust doctrine.

Chapter 5
Attachments

Attachment 1

Sacramento River Flow Below Freeport (PROSIM)

Run Date 12- 9- 98
Sacramento River flow below Freeport
NA3_P27M = PROSIM99;CVPIA PEIS NAA;C09A;BDPA;1993 WRBO;L2 REFS
Equation is +flow 17
Report is in ascending order by year   Units are in CFS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	11615.4	11405	16867.6	17043.1	31037.4	28152.6	20804.8	41586.9	34504.5	16308.2	19145.1	14998.7	263469
1923	10500.5	15249.9	26996.8	29888.8	15827.1	14586.5	22987.9	15430.1	14981.7	20416.7	18140	16513	221519
1924	12196.2	10631.7	17212.3	16164.5	15932.7	11715.8	6408.9	7396.3	6492.1	6698.5	6399.5	6475.8	123724
1925	7843.2	7240.2	11707.6	11136.4	47757.2	23073.1	21427.2	13426	14215.6	17420.9	14361	14864.1	204473
1926	9817	9075.5	11675.4	17269.1	35393.7	15097.3	18014.9	16304.3	13214.3	12836.7	8715	11565.2	178978
1927	8513.2	22651.9	22241.7	34992.4	73073	40247.9	44197	24008.7	16302.8	18417.6	20297.3	15183.9	340127
1928	10024.9	21587.6	15509.9	24642.1	23988.3	66689.9	25834.7	19635	14020.8	17452.4	18549.5	15124.3	273059
1929	10490.5	11550.7	16604.3	16970.4	15423.3	11951.6	7023.3	8651.4	8893.8	9796.5	9247.7	8137.7	134741
1930	7506.7	6976.1	15610.4	20440.4	16500.5	27466	11876	10737.4	9752.1	12190.8	11309.9	14796.6	165163
1931	8276	8531.3	12240.9	13942.5	13153.2	10337.2	8777.6	8105.5	6817.8	6917.2	6822.4	6886.4	110808
1932	5916.3	6318.6	17210.4	19436.5	13607.4	10796	9069.5	11480.5	13578.9	11878.2	10893.3	12618.1	142804
1933	7864.3	7368	12017.7	14235	12717.9	12492.6	10808.1	8465.7	9473.2	8553.8	8320.2	8441.3	120758
1934	7010.8	6397.5	13560.8	17158.6	13547.7	11287.9	9934.2	7697.6	9262.4	7280.8	7436	7058.7	117633
1935	6101.8	10662.5	9482.6	25261.2	12402	23998.9	42048.8	31023.1	15328.3	16430	19230.5	15675.4	227645
1936	11653.5	10859.7	16917.4	34979.6	55552.6	29441.8	19631.7	14581.5	14418.3	18634.2	18809	15565.7	261045
1937	9839.8	10675	16574.2	13574.9	29892.1	38121	20894.9	17765.6	14536.3	14886.9	18887.1	15629	221277
1938	9945	23180.6	41602	28121.2	68662.7	69657.7	52311.4	48934.6	36059.5	17629.1	16782.1	15274.9	428161
1939	16454.7	13556.7	15437.8	14674.4	13567.3	13013.9	9521.1	9152.2	10461.3	12692.4	10321.3	12404.1	151257
1940	8461.6	8828.9	11726.1	29520.6	56871.9	66662.6	50955.4	17861.8	13028.7	17772.5	18464.2	14582.5	314737
1941	9243.4	11205.5	40827.2	61052.5	69455.8	57637.8	51775.4	38723.8	21053	15351.5	15300.2	14997.1	406623
1942	15051.5	14975.7	52676.2	57287.1	73689.1	24000.1	41716.6	35234.8	27515.6	15720.5	15698.8	13951.8	387518
1943	14443.1	19690.5	28992.2	58213.6	46764.1	57745.6	27460.5	18481.5	11883.9	15637.7	19611	15224.4	334148
1944	10513	11484.6	16511.9	16602.4	24403.2	20425.2	10996.7	10684.2	14001.1	16566.5	12399	14316.6	178905
1945	8494.3	14772.3	17880.2	13857.9	46171.2	26782.6	12030.6	12127.1	16682	17930.2	18050.5	15394.4	220173
1946	9156.4	15806.3	51021.4	45535.3	28155.6	17172	12812.4	15133.4	16444	18656.8	17771.1	15149.7	262814
1947	10314.1	11302	15890.7	15583.3	17708.9	18786.9	15610	9578.4	11662.8	11481.7	8884.3	10746.2	157549
1948	9086.1	10353.4	8642.5	16045.1	11563.5	16097.4	29464.2	30098.5	21858.1	20764.7	17237.6	14214.5	205425
1949	10962.7	11692.7	16951	15614.6	12474.9	40035	13011.4	14070.2	15221.3	15477.6	12538.4	14017.8	192067
1950	9634.8	9842.1	10538.1	19905.2	32906.7	21890	18519.1	16664.6	16321.6	19042.1	16994.9	14079.8	206339
1951	11815.5	39070.5	62385.7	53917.1	53210.5	31880.9	17254.1	17221.2	14159.8	19680	19601.2	16548.6	356745
1952	10015.5	17856.9	40931.7	58671.9	59357.9	50258.5	53301.1	52028.5	39967.6	22031.3	19308.6	16177	439907
1953	14637.6	13406.3	39782.5	62759.4	24935.8	22471.4	16792.4	24623.9	28019.3	17135.8	18281.9	15060.8	297907
1954	14755.6	20028.2	15079.5	33582.6	51069.7	45657.8	38982.3	23745.2	14693.2	18326	19212.6	15102.2	310235
1955	10637.1	17456.5	24904.7	18889.3	15852.7	11902.9	9866.4	11717.8	16269.3	14777.1	11737.2	13426.2	177437
1956	9196.8	10996.7	60948.3	70922.8	60619.8	35218	20009.8	39126.4	23606.9	17762.8	17943.1	16048.6	382400
1957	17920.1	12052.5	11702.6	16602.9	34242.7	42939.6	20024.6	16127.2	16752.9	19170	19585.6	16126.2	243247
1958	19574.2	16845.5	24277.5	37361	73963	62274.4	60919.1	40564.6	37554.5	19337.4	18850.7	18782.4	430304
1959	14537.5	12090.9	12342.8	37902	44735.1	21492.6	12635	14531.1	14509.8	15756.7	18080.6	14203.1	232817
1960	11958	11242.5	17670.7	16064.4	27621.2	20241.1	16220.7	11095.4	12781.8	15591.5	11869	12197.3	184554
1961	9291.4	13109	15566.9	11799.5	32958.2	18533.6	14859.7	12088.2	13153.5	13338.3	11171	11337.8	177207
1962	8993.8	8932.8	15581.4	10974	46529.9	30768.7	14472	17925.8	14426.6	15574.1	17964.1	14458.2	216601
1963	30551.1	16558.7	27603.4	15791.3	56260.7	29144.6	62091	27184.5	15423.6	18824.3	20183.9	14990.2	334607
1964	16004.3	28021.6	13963.6	26035.3	15557.8	11557.3	11940.9	12656.7	13833.5	15023.1	10879.9	12168	187642
1965	8843.3	15196.4	62905	68251	31732.9	21462.2	43661	23854.3	13583.1	15102.9	19049	12539.5	336181
1966	8871	22570.2	15727.8	31931.8	23859.6	23999.7	15152.7	17969.1	14393.3	15543.3	17572.1	13863.4	221454
1967	11357.2	17907.9	36328.8	38124.1	46627.2	46589.7	37388	41521.7	41311.9	19873.7	18218.8	16449.1	371698
1968	15248.1	13185.1	15198.3	29805	52994.3	35541.2	15428.5	13450	14467.1	17062.8	18248.3	15909.6	256538
1969	12092.9	12470.5	25620.8	68720.4	69703.6	42811.1	41632.9	40411.2	26265.6	16948.6	17374.6	17797.3	391849
1970	16305.3	14268.8	49768.9	70029.2	62255.7	35204.1	13417.9	11612.5	14522.3	19963.9	19596.9	15780.6	342726
1971	9903.5	25719.5	48474.5	43574.6	30392.6	39155.6	21361.1	26771	23759.3	18331.5	19836.1	16022.3	323302
1972	14178.5	12598.5	22137.3	21670.7	21627.9	32409	14981.3	14201.9	14541.4	18112.8	17434.3	14586.4	218480
1973	11859	22891.1	24939.3	55935.8	60045.8	45309.5	16794.9	15432.3	15717.4	19381.6	19430.7	16182.1	323920
1974	12675.7	50389.6	55493.8	68812.2	41062.3	66791.2	55458.6	23370.3	22911.8	21118.3	19787.4	19123.4	456995
1975	14568	13397.8	17170.4	16625.3	51942.3	58294.6	22533.5	29662.1	26869.4	18238	18631.5	17228.3	305161
1976	19544.1	15709.8	14890.6	13691.2	13308.7	14537.2	9396.2	9705.5	9655	13872.3	10856.5	11993.5	157161
1977	7361.5	6818.2	7329.7	11327.3	15068.4	11408.4	7319	6851.3	6824.8	7111.4	6418.6	6724.6	100563
1978	5316	6019.6	13340.8	48424	45971.7	53800.6	36412.2	19198.1	15072.8	11890.5	18848.3	13113.1	287408
1979	9482	11418.1	16296	21765.3	35334.3	30377.2	15371.5	13630.8	19471.8	18174.8	18910.4	16581.9	226814
1980	10665.7	16708.3	19161.5	62884.1	73919.1	43405.1	18246.1	14016.8	13075	13819.6	16597.7	12765.7	315265
1981	10139.6	9805.6	16723.1	27514.9	26167	28974.9	13111.8	10018.2	12733.1	14304.8	12993.6	13921.7	196408
1982	9043.7	37857.7	64799.2	58419.5	69538.7	57976.8	71892.2	33153.8	22971.6	18678.5	19567.5	20006.1	483905
1983	21568.9	33513.6	55121.5	57377.8	76533.5	66861.9	52813.5	50166.3	48195.4	25547	21353.7	26017.2	535070
1984	18325.9	53134.7	71257.8	49464.8	33237.7	31940.2	16123.7	11162.1	16108.8	19110.4	19427.3	15465.3	354759
1985	11449.5	31038.2	24837.8	16483.9	14791.4	14034.5	12532.7	14402.2	13226	15399.9	10541.1	12818.9	191556
1986	8546.7	9917.9	15495.5	19680	82720.3	70503.6	20728	12173.3	11658	12941.3	19340.1	14832.3	298537
1987	10730.2	8811.1	16907	17405	19067.6	22969.3	12962.6	9994.1	12757.5	11573.2	9346.7	8885.7	161410
1988	7745.2	7590.4	15795.1	24306.4	11976.5	11219.4	9178.1	9170.5	9724.1	10608.6	9058.4	9301.5	135674
1989	7266.1	9954.1	9522.6	11687.7	9755.7	43369.4	21451.9	14772.6	15031.6	15385.6	12629.1	12844.2	183671
1990	9578.9	7628.2	9417.3	18192.1	15065.4	12167.5	15934	11920.1	12225.2	13289.1	10960.2	9994.5	146372
Avg.	11441.8	15624.1	24761.3	31341	37098.8	32185.8	23863.4	19598.1	17249.4	15863.1	15555.3	14076.3	258658

Run Date 2-10- 99
Sacramento River flow below Freeport
TRN_RM2K = PROSIM99;TRINITY R EIS/EIR MAX FLOW #2;C09A;BDPA;1993 WRBO;L2 REFS
Equation is +flow 17
Report is in ascending order by year

Units are in CFS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	10944.6	10280.3	16215.2	16544.6	30452.7	27353.2	20854.5	40588.9	34010	15400.6	18097.4	14934	255676
1923	10191.2	13338.8	26823.9	28946.4	15786.2	14613.1	23203.4	14449.7	15204.4	18718.5	17404.9	16502	215183
1924	9820	9025.6	14556.4	16164.5	16236.3	13339.9	6249.5	7319.8	6483.8	6633.1	6392.1	6475.3	118696
1925	7720.7	7072.9	11621.2	11101.6	47594.9	23047	20814.5	12441.2	10408.6	14740.3	13550	14516.7	194630
1926	9128.7	8844.5	12263.6	17439.8	35516.9	14858.3	17484.4	13210.8	8663.2	9305.3	8396	12435.6	167547
1927	8650.4	22623.8	17332.4	32488.3	73416.9	40426.6	44133.8	23008.7	16302.8	18405.3	20298.8	15164.5	332252
1928	9842.4	15045.6	14948.6	24423.3	23804.5	66176.9	26002	19370.8	10787.3	14825.2	15637.7	12422.3	253287
1929	9127.7	11012.6	14131.4	16970.4	15397.6	11896.4	6892.5	8225.2	8526.3	7147.1	7436.6	7767.8	124532
1930	6631.6	6407.7	15662.3	20693.4	16422.8	27613.1	11410	10401.8	9561.8	12028.8	10984.3	14723.2	162541
1931	8289.9	8916.6	11670.9	13886.5	12994.5	10313.5	9289.8	8101.6	6816.4	6970.8	6644.2	6704.7	110599
1932	5849.1	6254.1	17156.3	19389.7	13368.8	10819.4	8621.2	11312.2	13203.3	11130.4	13502.9	12949.4	143557
1933	7936	8165.4	13529.8	14204.8	12653	12233.9	11928.1	7782.7	8891.1	6777.1	7239.2	7314.6	118656
1934	6677.8	6272.7	13459.2	16963.1	13388.7	11179.5	9976	7626.2	9369.2	7384.2	7308.4	6690.2	116295
1935	6323.3	10668.8	9155.5	24997.8	12166.9	23848.3	40669.9	31161.5	12416.1	12136.2	16652.8	13601.2	213798
1936	9517.5	8546.5	14416.8	34155.9	55437	29324.6	20029.1	13131.4	13251	16103.7	17290.1	14477.8	245681
1937	8556.5	8190.1	14651.1	13075.3	30847.6	38047	21313.3	17354.3	13527.3	13585.6	16968	14809.3	210926
1938	9613.7	22956.1	45425.7	29613.8	68624.3	69655.6	52186.5	48388.5	34410.8	15302.5	14522.4	14908.3	425608
1939	12087.8	13295.7	14924	14263.3	13203.3	13175.7	9385.7	8818.7	8710.2	10487	9980	13612.5	141944
1940	7782.5	8790.1	12846.2	26887.6	49166.2	66630.1	50971.1	18016	12237.6	14279.5	16558.6	14267.1	298433
1941	8736.4	10600.4	38489.5	61010.8	69431.8	57287.9	50598	36628.4	17753	13655.8	13027	14395.8	391615
1942	11582.6	12928.7	51033.9	56204.2	73438.2	24000.1	41651.7	33109.2	24756.9	13410.2	13504.1	13951.8	369571
1943	11217.1	17584.2	27933.6	58367.4	46515.3	57152.1	27395.8	18039.4	11883.9	13876.6	19611	15245.3	324822
1944	10178	10092	16569.2	16602.4	24007.7	20333.6	11222.1	9557	12055.9	11571	12436.8	13785.6	168411
1945	7699.9	14345.5	16107.8	12951.9	42095.2	26435.8	11882.9	12228.7	16680.6	16736.6	17047	14497.3	208709
1946	8584.7	12946.8	51217.6	45506.9	28537.8	15568.7	12079.2	15126	16535.1	14512.3	15947	12655.4	249218
1947	8789.9	10021.7	15935.9	15579.4	17511.8	18685	13415.6	8803.4	8164.1	8598	8759.5	11567.5	145832
1948	9205.3	10314.8	8603.1	14914.5	12239.1	16057.7	26578.5	29996.6	21920.2	18351.8	17780.4	14174.3	200136
1949	9670.3	9654.8	15812	15614.6	12586.4	40796.9	12729.6	11103.1	10871.4	11411	11099.5	13774	175124
1950	7773.9	8558.7	10335.1	22031.1	32823.8	21807.5	17706.9	16742.6	16359.1	15729.8	17037.2	14037.5	200943
1951	10763.1	41424.8	62664.3	53880.8	53112.3	31809.1	16765.4	16265.6	12815.4	15551.5	18498.8	16356.3	349907
1952	10229.2	14948.1	40836.7	58803.6	59112.8	49666.5	51948.5	50448.8	37714.8	19753.5	16772.4	15679.8	425915
1953	11305.4	12574.4	39422.7	61936.9	24935.8	22471.4	15441.6	23623.9	25397.3	16059	20068.6	16084.5	289322
1954	9886.3	15501.1	16691.8	27098.4	50013.8	44376.6	37374.4	24346	13830.2	15823.2	16591	12993.9	284527
1955	9422.3	13296.8	24130.7	18460.8	15845.8	12261	8984.9	10439.4	9903.6	9094.1	8339.5	11824.8	152004
1956	7650.1	10572	64629.8	70920.3	60537	35114.1	19435	37334	21315.4	15094.7	19134.8	12784.5	374522
1957	13265.7	11961.2	15520.4	17006.5	29115.3	42196.1	19205.5	15609.2	15642.2	18081.6	18851.3	15485	231940
1958	17131.9	15319.8	22455.4	34922.1	73797.3	61796.3	60346.3	37476.9	34254.5	17758.9	17127.6	15959.9	408347
1959	11115.9	11867.3	12169.7	37160.3	44151.6	19526.1	12620.2	14491.3	12372.9	13077.8	15376.8	13480.5	217411
1960	9695.5	9593.5	14840.2	16049.2	27499.3	18236.7	13884.4	10846.7	8407.3	11203.3	11443	11735.1	163434
1961	7294.8	13867.2	21727.3	12612	33159.1	18282.3	11289.3	9885.4	9023.5	9162.5	11250.1	11319.8	168873
1962	8399.3	10125.6	20110.9	11309.6	46661.9	30860.8	14377.5	17915.5	13423.2	13675.4	16284.2	13194.8	216339
1963	29268.4	15782.3	26438.1	15711	56965.8	28960.3	62013.5	26184.5	15423.6	18432.4	20219.8	15002.9	330403
1964	11211.2	24820.3	15914.4	25472.3	15557.8	11611.4	11641.6	11361.3	9881.4	10751.3	8823.2	12701.3	169748
1965	7204.2	14219.4	61019.8	68223.8	31597.3	21331.6	43383.3	23856.4	13562.9	14307.7	19035	12522.1	330264
1966	8797.8	17779.9	13712.9	31260.5	23859.6	22762.4	15152	17633.5	13385.4	12870	15134.2	12329.1	204677
1967	9978.2	13632.2	35103.5	36295.2	46554.6	46494.9	37227.6	40560.8	38580	17547.1	16186.7	15068.9	353230
1968	11613.8	12541.8	14838.9	29160.6	51223.4	35339.7	15002.3	13450	14024.2	14732.3	16825.4	13849	242601
1969	10543.8	10380.9	22202.6	67140.3	69660.1	42713.4	41474.4	39670.7	23812.7	14425.8	15193.7	16923.2	374142
1970	12734.9	14246.5	48530.8	70635.9	61841	35204.1	13502.6	11612.5	14522.1	19941.4	19598.7	15780.4	338151
1971	9903.5	17001.5	44588.2	43558.5	31269.5	37410.9	21831.3	24345.9	22053	18908.4	19761.1	16022	306654
1972	10192.4	12099.4	17841.3	19176.7	21425.4	29093.1	15651.9	14183.4	14540.7	17270.6	14281.4	12093.5	197850
1973	9650.6	18327.6	24424	53556.2	60127.9	45222.7	16652	14948.7	14057.7	17830	18450.6	15619.4	308868
1974	10357.8	46934.1	53997.9	68656.2	40949.7	66225	55101.5	20670.7	19611.8	19376.1	18098.8	16365.5	436345
1975	11361.5	13397.8	16825.3	16349.1	52041.9	58120.8	22533.5	27328	23569.4	15812.7	16624.6	15722.8	289687
1976	15817.6	15179.9	14986.9	15995	13301.2	13287.4	9112.2	8734.9	9857.9	10093.3	8642.7	11014.1	146023
1977	6988.2	6797.9	8643.6	10577.2	14962	9871	8067.6	6851.3	6825.6	7111.4	6428.4	6698.7	99823
1978	5596.7	5900.4	13248.5	46325.7	38920.3	53298.2	36412.2	18198.1	15072.8	11194.2	17269.3	13113.1	274550
1979	9482	10545.2	14341	21442.6	34911.4	30378.8	15585.9	12129.1	18736.1	14935.7	17866.1	13899.4	214253
1980	9733	16202.4	18762	62172.7	73308	43367.9	18316.3	13516.8	12583.1	10885.2	16472	12811.3	308131
1981	9632.7	8917.4	16723.1	21903.5	25331	28545	13654.7	8444.8	8573.4	10521.6	11172.7	13866.7	177287
1982	9019.9	40033.5	64283.7	58081.2	68478.7	57265.2	71804	33153.8	21011.2	15424.1	17307.8	19625.2	475488
1983	17031.8	32894.7	54344.8	55946.6	76330.7	67751.8	52208.7	48347	47288.5	24634.2	19974.2	18764.8	515518
1984	15119.1	51931.7	71155.4	48567	33237.7	31077.8	16123.7	11162.1	16124.3	19105.3	19427.6	15465.3	348497
1985	9142.3	27114.1	23165.3	16698.4	14559.4	13195.2	12029.3	11294.4	9263.4	11450.5	10238.8	12301.2	170452
1986	7454.6	9383.5	15348.1	18435.5	82849.3	70484.7	20728	12173.3	11658	11627.2	19337.6	14829.8	294310
1987	10772.1	8886.6	16907	17405	19067.2	22959.2	10582.2	8722.3	8600	8334.1	6863.3	7431.6	146531
1988	6427.1	6456.8	15651.8	24113.8	11562.6	8025.7	9188.2	8266.6	9210.8	9238.5	7755.2	8913.2	124810
1989	7711.6	9901.3	9338.3	11475.7	9752.2	42255.7	21915.2	12117.7	9914.4	11335.4	10467.5	13213.2	169398
1990	9845.4	7870.1	9457	18315.1	14650.9	12098.9	12708.1	8701.4	11513.9	11724.3	9773	10511.9	137170
Avg.	9954.8	14391.1	24345.3	30779.8	36636.3	31791.7	23448.6	18671.7	15610.4	13672	14465	13358.3	247125

Run Date 4- 1- 99
Sacramento River flow below Freeport
TRN_RECD = PROSIM99;TRINITY R EIS/EIR EXIST. CONDITIONS;C09A;BDPA;1993 WRBO;L2 R
Equation is +flow 17
Report is in ascending order by year Units are in CFS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	10311	10120.1	15279.4	16553	30387.3	27300.9	21052	45265.1	34871.9	14068.6	14725.3	14462	254397
1923	11933.2	15538.4	32518.9	30261.8	20487.4	14557.5	21815.4	15686.6	13302.4	15029.7	17673.1	14029.5	222834
1924	10565.9	10592.1	17459.8	16476.5	15555	9447.5	6801.6	7797	7750.5	8811.4	6795	8420.9	126473
1925	7646.1	7319.4	11175	11180.8	48883	31130.9	19967	14146.2	14551	17591	14165.6	14893.2	212649
1926	10269.8	9346.5	10367.7	16802.5	34903.4	15516.9	18216.7	16187.2	13487.4	15585.1	10153.4	12155.4	182992
1927	9098.2	21487.8	21467.1	35149.2	73770.1	40561.8	44242.6	24386.6	16619.6	15053.6	15247.6	12102	329186
1928	10377.7	25329.9	15186.6	25594.5	26363.7	67695.2	25967.2	19434.7	13601.7	16245.9	18364.1	15044.3	279206
1929	10624.2	11658.1	16780	17167.7	15492.4	11781.1	6993.4	8593.6	10885.8	13513.2	10632.8	10170.2	144292
1930	8245.5	7198.8	15543	20421.7	16540.2	27083	12463.5	10863.7	11330	12751.8	10863.9	14013.6	167319
1931	8313	8279.4	10812.2	14027.1	13621.2	10743.7	9030.2	8102.7	7025.2	7346.8	7263	7023.4	111588
1932	6177	6282	16584.8	19513.6	14741.4	11047.3	9630	12292.7	14341.8	12477.4	11756.1	13930.9	148775
1933	8430.1	7204.4	11941.6	13472.5	13025.9	12213.3	11842.9	8614.7	9319.9	8928.1	8669.6	8611.1	122274
1934	7101	6568.8	12874.8	17345.7	14160.3	12113.7	10251.2	7920.6	9443.9	7682.8	7525.9	8801.6	121790
1935	6175	10073.1	9245.6	25067.9	12309.7	23599.7	42219.9	31189.4	14416.5	14319.2	16986.8	13813.3	219416
1936	10821.7	10415.9	17428	35236.6	56122.5	33321.9	19778.7	14826.1	14738.8	13412.4	13649.8	13090.3	252843
1937	9715.6	9936.2	17145.6	14000.7	31600.7	38110.9	21000.4	16333	12632.9	11456.2	15188.6	12836	209957
1938	10049.8	23290.2	53905.7	33164	71232	69836.7	52481.4	49445.1	37943.9	18578.1	17699.8	16083.7	453710
1939	16541.5	13641.2	15245.8	14432.4	13371	12787.5	9169.3	9180.1	12611.7	14899.5	12302	13104.3	157286
1940	9638.8	8188	13211.4	29383.2	55606.5	66803.3	50856.1	17874.8	11989.1	17516.8	18142.2	14443.5	313654
1941	9226.5	11068.3	40464.5	62049.6	69582.2	57738.1	51757.3	39024.5	21979.1	16168.7	16670	15989.2	411718
1942	15173.2	14832.8	52406.9	57441.2	73833.5	23771	41803.2	35578.5	28420.8	16837.4	16786.9	14928.8	391814
1943	14822.2	19432.4	28504.1	58258.1	46824.7	57839	27310.1	17126.5	12200.6	13586.3	15862.2	12269.7	324036
1944	11098.6	11997.1	11375.9	16668.1	29899.2	22028	9826.7	9749.5	12669.7	16634.9	14514.5	13711.7	180174
1945	10222.3	14125.2	19455.8	13538.4	48620.1	26557	12608	11866.3	14036.3	13979.3	16853.8	13099.6	214962
1946	9537	17140.3	54904.3	47231.2	23798.7	21344.7	13090.9	15466.8	14161	14845.6	17634.5	14542	263697
1947	10121.8	11230.3	16382.5	15834.9	17755.6	18705.8	16245.9	10550.4	14563.4	17562.4	14741.1	14276	177970
1948	10477.3	11208.2	10133.7	14695.6	16362.8	16319.6	25070.8	30168.5	22499.3	20821.6	19020.2	17555	214333
1949	12110.5	11075.3	17460.8	15871.3	12324.4	38740.3	12996.5	13104.9	15090.3	15237.8	12420.1	13924.7	190357
1950	9296.8	9516.6	9587.2	20790.2	32698.3	21725.9	18684.5	16597.4	16095.4	19788.8	17547.3	14489.1	206817
1951	11866.9	42474.7	61644.9	54063.3	53294.8	32037.7	17431.5	17328.5	13560	18278.3	19665.6	15371.6	357018
1952	9935.2	17381.9	43229.1	59698.9	59444.6	50371.4	53444.5	52469.8	40446.9	22887.1	20196.5	17126.3	446632
1953	15008.3	13253.1	39394	62915.5	25057.3	22326.5	16722.9	24903.4	28590.1	17962.8	18342.4	16610.4	301087
1954	15193.6	19817.2	14835.7	33477	51042.6	45706.2	39082.8	23592.3	13787.5	17206.8	19212.1	15293.7	308248
1955	10599.8	16900.1	24416.2	19206.4	16162.8	11906.2	9673.7	11674.8	16405.4	16883.9	14084.3	14417.7	182331
1956	9872.2	10887.4	62125.7	71091.9	60667.2	35552.3	20012.1	39393.2	24314.3	18598.9	18857.7	16930.2	388303
1957	17997.9	12238.1	11841.2	15338	34845.7	43084.1	19476.7	16520.2	14467.1	18110.9	18945.4	15155.8	238021
1958	20142.3	17093.6	24690.2	37945.3	73466.2	62448.1	60987.4	40969.6	38248.7	20323.9	19986.3	19737.4	436039
1959	14911.8	12306.8	12215.9	37687	44764.7	20824.9	12414	14472	14281.1	15754.2	18572.5	13851.5	232057
1960	10619.3	9979.5	17848.5	16389.1	27675.8	20613	15289.8	11173.5	13993.3	18507.4	15379.3	15008.8	192477
1961	10485.8	11342.1	14972	11364.4	32587.2	18146	15588.6	13526.1	13992.9	15493.8	10519.8	12307.9	180326
1962	9018	9050.5	16308	11107.5	47137.6	31003.5	14542.9	17565.8	14476.6	15004.7	17403.4	14269.6	216888
1963	31462.4	16529.8	27400.7	15696.2	56985	29026.2	62184.3	27666.5	15843.9	15262.3	16444.7	16354.1	330856
1964	16842.1	32403.9	13286.8	28555.4	15631.5	13620.9	9376.6	11231.8	13710.5	19147.5	14285.7	13558.8	201651
1965	9836.7	13593.6	63027.5	68384.7	31771.3	21585.9	43394	24076.8	13816.8	15235.7	18360.5	11943.6	335027
1966	9515.1	25366.4	15502.7	31562.7	23786.7	24079.6	14572.4	18073.9	13236.7	14528.7	18099.4	14579.8	222904
1967	10431	18457.6	36259.4	41633	47473.8	46578.8	36967.7	41812.5	41904.8	21008.9	19347.4	17483.2	379358
1968	15601.2	13069.7	15011	29427.8	53011.9	35618.1	15326.3	13496.2	13906.1	15229.7	17562.6	14630.2	251891
1969	10471.2	12208.3	25445.9	70299.5	69811.6	42943.6	41641.6	40935.4	26889.9	17491.1	18659.1	18700	395497
1970	16462.3	14267.7	49447.7	70351.5	62290.8	35195.7	14406.3	12503.6	13629.3	17010.5	17509.6	13544.1	336619
1971	9659.4	24527.8	50150.5	45030.1	27621.9	44092.2	20603.9	27770.8	24503.9	18625.2	18835.5	17166.6	328588
1972	15657.8	13628.3	21592.4	21716.5	21573.4	32657.4	14456.2	14199.8	15163.9	16307.6	19221.5	15248.4	221423
1973	11595.9	21413.8	24577.5	56547.6	61564	45333.5	17044.1	15918.2	13293.8	16616.7	17553.1	14152.4	315611
1974	12854.9	56562.8	55688.3	68870	41202.7	66841.2	55705.1	23868.2	23695.4	21768.3	20715.8	20035.4	467808
1975	14678.8	13491	16590.6	16713.7	51848.9	58400.4	22271	30511.9	27606.5	18836.9	19712.4	18169.8	308832
1976	19376.4	15794.9	14855	13665.6	13680.6	14616.6	9255.3	9788.9	9807.1	11271.4	13124.7	12258.4	157495
1977	7485.2	6844.8	8643.4	11214.2	15151.1	11522.5	7761.1	6968.5	7263.7	7494.9	7147.9	7461.6	104959
1978	6634.4	5775.7	12543.9	47812.9	45869.3	54300.6	36141.9	19704.9	15425.9	13164.1	14786.7	16514.4	288675
1979	10415.5	11385.5	10711.3	24879.2	39383.8	30329.9	14999.3	14782.6	15607.3	13433.7	16814.9	13294	216037
1980	10445.6	16395	18681.5	68441.4	74054	43503.5	18302.3	14266.1	13472.1	14697.1	16021.2	13589.5	321869
1981	10517.9	9957.6	17510.4	28123.7	26027.8	29033.3	13942.9	10149.9	13187.1	18019.4	15014.7	14829.9	206315
1982	9244.5	35087.6	64731.6	58411.1	69800.3	57916.4	72244.4	33491.7	23992.3	19786.9	20630.8	20633.3	485971
1983	21502	33756.8	55250.1	57434.3	76768.4	67026.3	52927.1	50534.1	49034.1	26466.5	22186.1	26951.9	539838
1984	18728.2	52609.3	71498.9	49487.1	33260.8	32094.9	16462.6	12073.3	13958.6	15940.5	17844.8	13851.4	347810
1985	11427.9	36609	24777.8	14359.7	18000.4	17458	10798.1	12507.3	12867.2	17882.1	14256.2	14458.8	205402
1986	9305.9	10030.9	15210.1	18857.9	82983.3	70508.8	20886.9	12491.6	11998.6	11681.6	14562.9	13326.6	291845
1987	10799.7	9011.5	16314	16225.7	18861.6	23005.2	12135.8	10308.2	13455.8	14826.3	12004.5	12891.2	169839
1988	10414.3	7878.5	15190.1	24626.2	14731.7	11286.5	10476.1	11375.2	11078	11218.8	9457.2	10563.8	148296
1989	7259.1	9317.9	9172.2	11730.5	10084.2	41973.4	21553.3	17048.7	13694.8	16099.4	12171	13807.6	183912
1990	9446.6	7727.6	9667	17470.8	14328.3	11779.3	15385.2	10462	11659.5	12632.5	10445.1	11023.8	142028
Avg.	11707.9	15804.7	24885.6	31673.1	37588.1	32561.9	23754.5	19840.3	17287.7	15759.8	15562.3	14332.1	260758

Run Date 12-21- 98
Sacramento River flow below Freeport
TRN_RPIA = PROSIM99;TRINITY R EIS/EIR % INFLOW ALT;C09A;BDPA;1993 WRBO;L2 REFS
Equation is +flow 17
Report is in ascending order by year

Units are in CFS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	11615.4	11405	16867.6	17043.1	31037.4	28152.6	20804.8	41080	34504.5	16065	19146.4	15000	262722
1923	10983.7	15249.9	27138.1	30228.1	15827.1	14586.5	22987.9	15430.1	14980.9	20416.7	18140	16513	222482
1924	12132.3	10631.7	17212.3	16164.5	15932.7	11807.9	6661.8	7654	6749.1	6763.9	6650.7	6727.2	125088
1925	7838.7	7264	11732.1	11165.1	47756.3	23080.8	21427.2	13426	14216.5	17420.9	14361	14637.2	204326
1926	9973.9	9302.5	11906.7	17338.7	35455.4	15131.3	18464.9	16166	13188.7	11649.9	8728.1	11525.2	178831
1927	8545.6	22668.9	23331.8	35067.7	73066.4	40452.2	44197	23508.7	16302.8	18410.8	20298.1	15172.7	341023
1928	9937.5	20937.1	15356.4	24428.6	23809.2	66283.3	25834.7	19673.1	14020.8	17449.8	18604.5	15120.6	271456
1929	10490.8	11550.9	16604.3	16970.4	15423.8	11952.2	7006.9	8626	8840.2	8358	9131.3	8150.4	133105
1930	7303.9	7025.9	15685.1	20399.9	16462.3	27448.5	11633.7	10736.8	9752.4	12191.4	11309.5	14795.4	164745
1931	8278.6	8536.2	12244.8	13942.5	13152.9	10337.2	8776.6	8105	6824.3	6917.2	6827.4	6887.9	110831
1932	5920.7	6322.3	17213.6	19439.2	13623.7	10796	9069.2	11480.5	13579.8	11842.1	10876.5	12653.6	142817
1933	7864.6	7284.1	12109.5	14235	12718	12490.4	11081.5	8441.7	9480	8553.8	8320.2	8466.1	121045
1934	7012.2	6398.6	13568.6	17169.4	13557.7	11551.4	10007.8	7958.2	9467.5	7411.7	7708.2	7314.6	119126
1935	6177.3	10721.4	9532.4	25309.4	12453.6	24035.4	42043.8	31022.7	15280.2	16384.9	19209.7	15582.9	227754
1936	11616.8	10843.5	16917.4	34979.5	55552.6	29441.8	19631.7	14581.5	14418.3	17770.3	18891.5	15557.1	260202
1937	9838	10674.1	16574.2	13574.7	29891.9	38121	20894.9	17762	14289	14399.8	18887.1	15629	220536
1938	9945	23179	42353.6	29720.3	68753.8	69657.7	52311.4	48662.5	34410.8	16801.4	15975.6	14908.3	426679
1939	15663.4	13295.7	14924	14263.3	13203.3	13013.9	9521.1	9152.6	10468.5	12692.4	10326	12512.5	149037
1940	8382.2	8811.8	11866.1	30332.1	56839.5	66662.6	50955.4	17854.5	13031.2	17772.5	18464.2	14582.5	315555
1941	9244.5	11206.1	39547	60875	69455.8	57325.9	50720	37171.7	20270.3	15351.5	15300.2	15502.1	401970
1942	15158.5	14672.7	52537.4	56719.6	73533	24000.1	41716.6	33609.2	25536.6	15720.5	15698.8	14581.5	383485
1943	14685.3	19631.5	28298.2	58417	46515.3	57202.7	27395.8	18546.7	11883.9	14032.5	19611	15238.1	331458
1944	10612.7	11484.6	16511.9	16602.4	24403.2	20425.2	11736.1	10429.9	14878.8	16505.1	12399	14317.3	180306
1945	8493.9	14771.5	18353.4	14227.9	45847.5	26782.6	12030.8	12127.5	16680.3	17471.3	18091	15394.4	220272
1946	9156.1	16413.1	51021.6	45535.3	28106.5	17152.4	12812.4	15133.4	16444.5	18666.6	17771.1	15149.7	263363
1947	10314.1	11302.8	15890.7	15583.3	17708.9	18785	15348.7	9563.3	11267.5	11126.3	8854.7	10396.3	156142
1948	9050.2	10332.3	8622.7	14841.4	10868.1	16081.6	29635.3	28988.8	21858.1	20764.7	18216.4	14219.7	203479
1949	10962.1	11739.5	16946.8	15614.6	12433.7	39677.3	13070.4	13552.4	14809.1	14846.1	11609.9	13200	188462
1950	9117.6	9702.8	9835.8	20423.4	32906.7	21890	18519.1	16668	16329.7	20812.5	17588.6	14545.7	208340
1951	11827.1	37544.3	62027.1	53917.1	53210.5	31880.9	17254.1	16745.7	14232.9	19680	19601.2	16548.6	354470
1952	10171	17808.3	40287.6	58628.8	59192.2	49748.3	52077.4	50714.1	38335.7	22031.3	19308.6	16874.2	435178
1953	14814.6	13406.3	39422.7	62759.4	24935.8	22471.4	15637.9	24123.9	25397.3	17135.8	19189.2	15376.5	294671
1954	14396.7	19969.2	15079.6	32312.7	50411	45168.3	38142.6	24019.4	14930.1	18326	19212.6	15102.3	307070
1955	10636.8	17456.5	24904.7	18889.3	15852.7	11906.5	9837	11718.1	15267.1	13940.1	10907.9	12234.2	173551
1956	8573.4	10515.3	61750.1	70923	60617.6	35211.8	19521.2	37698.8	21315.4	16577.3	17289.7	16164.5	376158
1957	18027.1	11961.2	15314.3	16686.3	30568.6	42251	20408.7	13859	17337.9	19148	19585.4	16133.5	241281
1958	18580.3	16584.6	24274.7	36859.5	74085.8	61859.6	60446.6	40564.6	36035.8	19337.4	18850.7	19287.4	426767
1959	14644.5	12087.1	12339.9	37087.4	44211	21620.4	12635	14531.1	14512.3	15757.1	18081.3	14203.8	231711
1960	11958.4	11242.6	17670.7	16064.4	27621.2	20241.1	15844	10704.3	12748.3	14998.5	10467.4	12152.5	181714
1961	9087.4	12735.4	15277.6	11722.3	32365.3	18497	15132.7	12088.4	13153.5	13335.6	11168.6	11251.2	175815
1962	8836.8	9310.1	15874.3	10966.6	45286	30769	14546.2	17925.8	14429.7	15598	18004.5	14485.6	216033
1963	29936.6	16558.7	27603.4	15791.3	56279.1	29144.6	62091	26684.5	15423.6	18547.6	20205.5	15002.9	333269
1964	14788.4	27962.6	13968.6	25543.8	15557.8	11563.4	11895.7	13100.3	13569.4	13566.2	10293.5	12391.9	184202
1965	8613.5	14976.7	63571.4	68250.5	31720.7	21449.3	43567.8	23884.6	13562.9	15116	19044.5	12533.7	336292
1966	8840.4	21990.1	15727.8	31529.4	23859.6	22859.8	15309.6	17969	14397	16159.8	17533	14373.3	220549
1967	11375.3	15901.2	36322.7	38041.3	46183.2	46589.7	37327.6	40873.4	38580	19029.7	17656.2	15842.5	363723
1968	15425.1	13126.1	14838.9	29160.6	52209.8	35335.9	15504.5	13450	14467.1	17062.8	18248.3	15909.6	254739
1969	12092.9	11959	25278.4	68715.2	69703.6	42811.1	41537.9	39987.7	23812.7	16720.7	17138.1	18158.3	387916
1970	16482.3	14246.5	49513.5	70029.2	61881.4	35204.1	13442.5	11612.5	14522.2	19957.3	19597.4	15780.5	342270
1971	9903.5	24771.7	48474.5	43574.6	30436.2	38670.4	21488.3	25418.6	22053	18908.6	19761.1	16022.2	319483
1972	13129.9	12284.6	19329.4	20671.8	21425.4	31111.3	15245	14201.9	14550.9	19548.5	17434.3	14586.5	213520
1973	11433	22355.3	24939.3	55935	59853.7	45309.5	16794.9	14948.7	15896.2	19381.5	19430.7	16182.1	322460
1974	13140.1	49676.5	55458.4	68812.2	41013.9	66368.3	55213.5	21170.7	20918.2	21118.3	19787.4	19401.5	452079
1975	14675	13397.8	16825.3	16349.1	52098.4	58157.1	22533.5	28069.5	23569.4	18238	18631.5	17925.4	300470
1976	19721.1	15650.8	14228.8	13243	13308.9	14551.6	9397.8	9707.4	9431.5	14082.4	10488.1	11690.5	155502
1977	7361.9	6806.7	7226.1	11196.5	15065	11420.7	7762.4	6851.3	6824.8	7111.4	6419.5	6724.8	100771
1978	5314	6020.3	13341.4	48521.5	45971.7	53460.9	36412.2	18698.1	15072.8	11202.3	18962	13113.1	286090
1979	9482	11418.1	16904.6	20024.3	34761.2	30377.2	15513.6	13493.3	19471.9	18180.8	18909.9	16581.9	225119
1980	10509.6	16684.2	19139.1	62625.9	73340.2	43405.1	18246.1	14016.8	13075	11578.7	17413.9	12765.7	312800
1981	10378.9	9805.6	16723.1	25143.3	25345.2	28644.2	13143	9509	12733.1	14312.2	12998.6	14461.9	193198
1982	9352.3	38059.3	64528.4	58426.3	69477	57386.2	71834.6	33153.8	21011.2	17639.4	18793.5	19625.2	479287
1983	20970.6	32894.7	55019.3	56555.5	76446.1	66861.9	52339.4	50166.3	48195.4	25547	21353.7	26522.2	532872
1984	18432.9	52774.8	71257.8	48790.3	33237.7	31077.8	16123.7	11162.1	16122.8	19105.7	19427.6	15465.3	352978
1985	11143.4	28288.8	24004.9	16698.4	14693	13844.5	12597.6	14056.5	13224.6	14493	10306.1	12864.3	186215
1986	8320.9	9764.8	15560	21930.3	82710.9	70503.1	20728	12173.3	11658	12693.4	19340.1	14832.3	300215
1987	10745.1	8823.4	16907	17405	19067.9	22963.3	12071.2	9477.2	12023.1	10696.9	8657.7	9002.8	157841
1988	7502.9	7352.9	15770.2	24990.3	11731.3	11150	8588	9006.4	9485.6	10308.9	8845	9328.4	134060
1989	7046.9	9734.8	9499.1	11662.5	9609.1	43353.8	21451.9	14773.7	15031.6	15385.6	12629.1	12844.2	183022
1990	9495	7557.5	9383.8	18142.9	15296.9	12167.5	15934	10857.1	11715.2	12370.8	10191.8	9922.5	143035
Avg.	11354.8	15432.2	24728.6	31234.6	36912.2	32053.5	23795.3	19279.4	16838.5	15630.4	15480.6	14115.2	256855

Run Date 2-25- 99
Sacramento River flow below Freeport
TRN_FES9 = PROSIM99;TRINITY R EIS/EIR FLOW EVAL STUDY;C09A;BDPA;1993 WRBO;L2 REF
Equation is +flow 17
Report is in ascending order by year

Units are in CFS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	11615.4	11405	16867.6	17043.1	31037.4	28152.6	20804.8	41146.3	34504.5	16049.9	19146.5	15000.1	262773
1923	11467	15249.9	27153	30190.3	15793.6	14586.5	22987.9	15430.1	14981.1	20416.7	18140	16378.6	222775
1924	11836.5	10633.3	17212.3	16164.5	15931.6	11566.3	6410.4	7392.6	6487.5	6633.1	6398.3	6475.3	123142
1925	7843.8	7235.9	11703.3	11130	47767.5	22821.4	20611.6	12928.3	14393.8	16889.4	14365.8	15011.8	202703
1926	10667.2	9693.4	11894.3	17055.9	35193.7	15034.5	17745.2	15999.3	10720.8	9680.3	8588.4	11651.2	173924
1927	8539.1	22503.2	19273.7	34746.8	73140.8	40460.5	44197	23508.7	16302.8	18405.3	20298.8	15164.5	336541
1928	10131.9	20934.8	15356.4	24428.6	23809.2	66286.7	25834.7	19672.7	14020.8	16092.4	18556.9	15125.7	270251
1929	10490.2	11551.6	16604.3	16970.4	15423.6	11955.1	7143.4	8489.1	8904.2	9507.7	9260.7	8093.4	134394
1930	7565.8	6704	15570.5	20402.5	16447	27434.2	11330.1	10718.7	9619	12008.9	11079.9	14710.8	163592
1931	8330.6	8567.9	12191.5	13913.9	13069.9	10298.7	8749.9	8090.3	6870.6	6899.8	6845.5	6895.8	110724
1932	5943.8	6333.8	17224	19447	13717	10819.4	8621.2	11312.2	13228	11012.3	11328.3	13713.7	142701
1933	8036.4	7192.1	12946.8	14112.1	12571	12388	11082.5	7781.2	9044.1	6891.3	7579.4	8304.9	117930
1934	6774.9	6332.3	13516	17165.8	13538.6	11186	9970.4	7662.6	9343	7359.2	7120.4	7004.2	116974
1935	5950.6	10501.8	9327	25135	12288.4	23966	41755	31085.2	15256.1	16143.8	19223.9	15549.2	226182
1936	11602	10832.4	16917.4	33652.5	55368.7	29441.8	19631.7	14581.5	14418.3	16065.2	19063.8	15577.5	257153
1937	9842.3	10676.2	16574.2	13574.8	29400.2	37300.2	20894.9	17816.4	14525.5	14091.2	18887.1	15649.5	219233
1938	9949.3	23178.1	42583	29736.6	68558.6	69657.7	52311.4	48662.5	34410.8	16801.4	15975.6	14908.3	426733
1939	13835.1	13295.7	14924	14263.3	13203.3	13052.2	9590.8	9094.6	12122.1	12363.1	12383.4	12514.4	150642
1940	10823.3	8360.7	12488.9	25981.7	52636.1	66657.2	50955.4	17966.3	12951.3	17749.2	18424.5	14555.8	309550
1941	9233.7	11195.3	39732.1	60870	69455.8	57671	51715.4	37951.6	18275.3	15351.5	15300.2	14997.1	401749
1942	14978.5	14975.7	52676.2	57287.1	73689.1	24000.1	41716.6	33609.2	24756.9	15213.4	15134.2	13951.8	381989
1943	13950	19690.5	28992.2	58213.6	46764.1	57745.6	27395.8	18518.3	11883.9	13442.8	19611	15244.2	331452
1944	10854.4	11484.6	16511.9	16602.4	24559.8	20310.6	10968.2	10420.8	15051.5	14004.9	13190.4	14040.3	178000
1945	10067.9	15621.3	16186.9	12795	42750.4	26782.6	12006.6	12185.5	16686.4	19045.4	17842.3	15441.2	217412
1946	9167.4	13618.2	51011	45535.3	28405.6	17270.3	12812.4	15126	16426.9	16412.4	17500.6	14732.5	258019
1947	10074	11237	15892	15579.4	17714.6	18781.9	13911.4	9815.3	11844.2	10616.9	10063	10645.6	156176
1948	9984.1	10202.3	8274.4	14558.7	13184.5	16098.6	24253	28510.3	21826.7	20750.5	18204.7	14186.8	200034
1949	10945.1	11499.9	16967.9	15614.6	12524.2	39934.6	12696.2	12547.6	12637.3	12701.1	11430.5	13054.4	182553
1950	9228.7	9794.2	9860.7	21577.9	32906.7	21890	18519.1	16650.5	16320.5	18757.9	17101.1	14149	206756
1951	11853.9	36613	63637.3	53917.1	53210.5	31880.9	17254.1	16745.7	14682.3	18112.9	19748.8	16564.7	354221
1952	9969.2	15582.4	40431.4	58650.8	59192.2	49748.3	52077.4	50714.1	37714.8	22031.3	18635.9	15990.9	430739
1953	14564.6	13406.3	39782.5	62759.4	24935.8	22471.4	16632.4	24123.9	25397.3	16275.6	19644.8	15875.9	295870
1954	13689	17750.4	15667.4	32994.9	51069.7	45657.8	38880.8	23780.3	14930.1	18326	19212.6	15102.3	307061
1955	10638.5	15394.9	24904.7	18889.3	15852.7	11913.7	9832.2	11706.5	15420.9	10982.5	10268.3	12330.2	168134
1956	9306	10752.8	61769.6	70923.9	60614.4	35199.4	20233.9	37698.8	21315.4	16577.3	17289.7	15687.1	377368
1957	16954.5	12052.5	14156.8	16686	31435.3	42939.6	20089.1	15535.3	16903	18290.7	19680.4	16137.5	240861
1958	19057.5	15466.9	23279.2	36935.8	74024.4	62274.4	60870	39910.3	34254.5	19337.4	18850.7	18408.1	422669
1959	14464.5	12090.9	12342.8	37902	44735.1	21543.1	12635	14531.1	14510.8	15548.5	18109.5	14204.8	232618
1960	11959.1	11242.8	17670.7	16064.4	28339.3	18015.8	14974.2	11606.5	12049	12239	11469.4	12223.5	177854
1961	9829.4	11706.5	15216.3	12264.2	32861.7	18473.8	14471.4	11309.1	12020.2	10134.7	10429.2	11214.5	169931
1962	9506.3	7933.2	15497.8	10981.8	46665.7	30793	14480.3	17930.5	14440.8	15996.1	18527.1	14880	217633
1963	29850.6	16558.7	27603.4	15791.3	55721.1	29144.6	62091	26684.5	15423.6	18952.2	20173.9	15006.3	333001
1964	13422.3	26714.5	14425.6	26035.3	15557.8	11564.7	11855.6	12882.5	12902	12034.2	11894.6	12156.9	181446
1965	9687	15550	60049.5	68375.8	31714.7	21442.8	43661	23858.3	13562.9	15105.3	19037.5	12525.1	334570
1966	9052.9	22113.1	15727.8	31529.4	23859.6	22859.8	15309.4	17969	14395.2	14478.3	17737.4	14404.6	219437
1967	11397.9	14926.3	36322.7	38041.3	46391.3	46589.7	37388	40873.4	38580	19029.7	17656.2	15068.9	362266
1968	14861.7	13185.1	15198.3	29805	52994.3	35541.2	15399	13440.2	14459.7	15782.7	17950.3	15393.3	254011
1969	11731.3	11922.1	20893.3	68984.7	69703.6	42811.1	41632.9	39987.7	23812.7	15925.8	16693.7	17392.1	381491
1970	16232.3	14268.8	49768.9	70029.2	62255.7	35204.1	13424.4	11612.5	14522.3	19962.1	19597	15780.6	342658
1971	9903.5	21437.4	48474.5	43574.6	30612.1	38582.5	21511.7	25754.4	22053	18825.4	19757.6	15960.4	316447
1972	12101.6	12343.6	19849.1	21670.7	21627.9	32409	14999.8	14192.3	14535.8	18102.4	16912.7	14200.3	212945
1973	11815.4	18826.9	24215	55955.2	60480.8	45309.5	16794.9	14948.7	16106.7	17750.1	19599.1	16198.2	318000
1974	13621.7	49176.5	55477.5	68812.2	41062.3	66791.2	55402.3	21170.7	19611.8	21060.5	19787.4	17521.5	449496
1975	14495	13397.8	17170.4	16625.3	51942.3	58294.6	22533.5	28069.5	23569.4	18238	18496.8	16723.1	299556
1976	19471.1	15709.8	14890.6	13691.2	13294.7	14605	9075.1	9216.9	9264.2	13797.3	10094.1	12049.1	155159
1977	6805.1	6459.5	9852.8	11194.2	15072.5	11423.9	7190.8	6851.3	6827.1	7111.4	6419.8	6306.7	101515
1978	5629.3	5455.7	13181.4	47340.1	45971.7	53199.1	36412.2	18698.1	15072.8	11202.3	18977.8	13113.1	284253
1979	9889.4	11418.1	16904.6	20024.3	34430.1	30377.2	15658.1	13498.6	19468.1	16255	19109	16597.8	223630
1980	10114.1	16678.4	19133.7	62716.5	73744.9	43405.1	18246.1	14016.8	13075	12131.1	17417.5	12765.7	313445
1981	10620.5	9805.6	16723.1	24434.7	25345.2	28644.2	13204.3	9544.4	10672.6	11561.3	13182	13953.7	187692
1982	9035.4	39792.8	64713.8	58411.2	69531.3	57967.5	71877	33153.8	21011.2	17421.4	18793.5	19625.2	481334
1983	18745.7	33036.4	55121.5	57377.8	76533.5	66861.9	52747.9	49981.8	48195.4	25547	21353.7	26017.2	531520
1984	18252.9	53134.7	71257.8	49464.8	33237.7	31940.2	16123.7	11162.1	16108.8	19110.4	19427.3	15465.3	354686
1985	11609.9	28064.3	23628.7	16348.9	14682.1	13715.5	12606.5	13165.8	12822.4	11725.9	11464.4	12828.4	182663
1986	9383.3	10576.8	15552.8	18489	82708.7	70517	20728	12173.3	11658	12048.7	19335.4	14827.7	297999
1987	10772.1	8862	16907	17405	19095	22963.3	11603.4	8985.3	11599.2	9476.6	9860.9	9019	156549
1988	8657.9	7793	16160.4	24371.4	11734.5	9634.1	8477.4	8143.8	10183.9	12060.1	9140	9795.6	136152
1989	7641.9	9811.7	9483.7	11646.2	10696.5	42549.1	21577.7	15519.5	13397.3	10979	10773.5	13023.5	177100
1990	9801.4	7874.7	9618.4	18318.1	14642.1	12146	13470.1	11520.5	11348.7	14706.4	10954.6	11299.3	145700
Avg.	11393.1	15150.5	24624.6	31147.6	36933.8	32042.8	23624	19236.8	16604.2	14950.6	15529.1	14005.3	255243

Run Date 5- 4- 99
Sacramento River flow below Freeport
P99N_CI2 = PROSIM99;CVPIA PEIS R. CUMUL. IMP.;C09A;BDPA;1993 WRBO;L4 REFS;B2(US+
Equation is +flow 17
Report is in ascending order by year Units are in CFS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	11024.1	11694.6	18433.5	17908.4	28055	29629.9	23179.9	39804.9	33939.6	17369.8	19219.8	14364	264624
1923	12832.8	15640.4	25686.5	28997.2	17775.3	16630.3	22779.4	14832.7	16741.2	19163.3	18340.2	16099.1	225518
1924	10120.5	9889.7	14723.2	15997.1	16320.8	11236.7	5993.8	7236.2	6424.5	7140.4	6430.2	6575.6	118089
1925	7440.4	6796	11188.3	10713.3	48234.1	23578.8	22908.6	14127.6	16917.9	13639.6	12902.9	14288.6	202736
1926	8238.9	8538.6	11022.2	17846	36073	16894.6	18960.9	11899.9	10693.7	9444.1	8282.6	11312.1	169207
1927	9450.9	23439	19561.6	34468.6	73029.9	41395.5	41945.2	24409.9	16238.9	21760.5	20074.2	16614.1	342388
1928	12137.1	17812.6	16201.3	24190.3	24689	62080.8	27699.2	13360.5	15386.1	18230.8	19198	15073.4	266059
1929	10099.4	12103	16479.8	16831.8	16166.6	12724.5	6966.9	7974.5	9743.1	7967.2	7282.7	8562.1	132901
1930	6309.3	5762.9	15281.8	21628.1	17797.9	28518.1	12715.2	12336.7	8746.5	8625.6	12241.3	12759.1	162723
1931	7874.9	8409.5	9339	14441.6	12952.9	15898	7028.7	7662.1	6630.6	7307.1	6854.2	7235.1	111634
1932	5636.8	5690.2	16620.4	20254.9	13591.9	10991.6	9485.7	12743.5	13179.7	8270.6	13516.9	12193.3	142175
1933	8705.2	8256.8	12087.7	14402	12648.8	13292	10052.2	8609.1	8590.3	6805.9	6870.9	6990.5	117311
1934	6602.9	5935.3	13069.1	17583.7	14098.8	11483.7	10041.6	8170.4	8924	7372.6	6999.9	8193.3	118475
1935	5806.8	9838.1	8716.9	24686.6	13370.7	24349.5	39616.3	25972.5	17645.6	16297.9	15534.5	14731.5	216567
1936	10174.8	9705.2	15206.7	32685.4	55223.1	29576	19932.6	15511.8	15076.4	19024.7	17463	15911	255491
1937	9352.8	9137	15766.6	13417.1	29195.6	36146	21268.4	14231.1	16115.3	16177.8	16329.5	14261.9	211399
1938	8901.7	22976.1	39753.4	28520.1	69940.1	69213.9	51888	48395.6	33755.1	17181.7	16899.9	11889.6	419315
1939	13705.3	13782	16409.8	17283.7	14451	14721.7	10594.8	9535.5	9236.9	8366.3	10683	11609	150379
1940	8381.1	8286.5	10533.2	26375.1	55513.1	66335	51213.8	17797	13484.2	18566.4	17663.1	13924.8	308073
1941	9423.2	11315.2	32705.4	60758.9	69398.4	56846.7	50911.4	37551.1	19326.2	15166.6	17046.4	12569.5	393019
1942	13567.6	14802.8	51305.9	56844.9	73736.7	27628.6	40758.6	29981.7	24067.8	15653.7	19437.9	14010.4	381797
1943	12096.3	14723.3	26927	58498.1	47243.7	56435.7	27199.7	18614.2	12652.1	19279.4	19539.1	16041.7	329250
1944	11644.1	12228.5	16604.2	17558.7	25537	22856.3	9578.5	9928.4	13942.1	11171.4	13980.8	12605.8	177636
1945	8572.2	15189	17207.9	14565	40245.2	24808.5	14272.1	12480.3	17455.2	18851.4	16609.3	14472.3	214728
1946	10144.4	13901.7	44541.1	44967.6	25910.1	18781.9	12288.4	13312.9	17891.9	19752.9	17375.7	16324.3	255193
1947	9827.4	11828.8	15957.5	15625.8	18730.3	20373.3	13278.3	10260.9	8744.9	8898	9948.9	11092.6	154567
1948	9413.2	10804.7	9159.9	15609.9	15462.1	17326.5	25182	26975.3	22212.7	20982.2	17915.9	14219.9	205264
1949	11217.7	11622	17236.6	15646.3	13802.4	36853.5	14122.6	12083.5	12703.5	9681.7	12496.7	13038.2	180505
1950	9170.6	10531.9	11752.1	20012.1	32422.4	22448.7	18012.2	16301.8	18681.8	19662.4	19103.6	13584.1	211684
1951	10649.2	37925.2	58736.4	53261.1	53407.4	31059.7	14846.8	16747.1	13990	19738.8	19717.4	15705.2	345784
1952	11545.6	15562.6	37330.1	58361.6	59037.9	49031.5	51666.3	50446.9	37088	21405.1	17103.2	15021.6	423600
1953	12822.9	14362.2	39046.7	62164.6	28092.5	25372.4	16924	21937.8	23733.4	20539.6	19778.2	16316.7	301091
1954	13429.7	17113.8	15522.8	25940.1	50593.6	43985.5	38440.2	18677.9	15035.9	19839.2	19705.1	15500.4	293784
1955	11729.7	16227.2	24032.1	21714.9	16334.6	15759.1	10114.2	11910	14733.1	11298.6	9775.3	12185.9	175815
1956	8613.7	11224.6	58036.2	71901.6	59886.6	36590	21540.6	33422	20108.6	18096.2	20026.7	15182.4	374629
1957	12453.1	12660.2	16881.2	17169.1	24530.8	41796	16984.7	17938.1	17418.5	21227.8	19526.4	16794.4	235380
1958	18147.8	15878.9	23948.9	36553.2	72161.4	61748.5	60393.1	39311.3	33599.4	19224.8	18012.5	17462.8	416442
1959	14788.3	12797.1	14497	36750.5	43673.5	22484.3	10631.3	12502.1	14793.2	16840.9	18381.8	14589.7	232730
1960	9916.9	9370.4	14874.2	15948.2	28269.2	20816.8	12467.4	11935.2	9489.9	9807.9	11701.8	11829.5	166428
1961	8874.1	13483.1	17015.9	15084.1	31556.7	20216.3	11494.5	13249.8	9084.7	8752.7	10327.6	10992.3	170132
1962	8797	9932.4	17695.1	13149.8	44761.5	30557.1	11440.4	12733.7	16264.5	18584.8	19657.1	16912.6	220486
1963	28662.7	14777.1	26507.3	17074.8	58129.8	30702.9	60085.4	26585.4	16579.2	21702.3	19806	15864.6	336477
1964	13750.9	23229	14719.9	24658.7	17550.2	16198.3	9659.6	10912.3	12236.3	12108.2	10562.7	12294.6	177881
1965	8448.8	15584.5	63511.2	68034.7	34100.5	24311.6	36503.6	19229.2	14933.1	19234.7	19892	14146.8	337931
1966	10595	19360.2	14905.7	28696.8	24988	20433.9	12208.8	13529.2	14545.4	16769.3	14205.5	13777	204015
1967	9836.5	14867.8	35232.3	38948.6	47833.7	45325.5	38029.1	39856.7	37939.7	19255.8	16436.2	14570.5	358132
1968	14844	13228.7	16294.8	29900.8	51715.1	36318.1	10998.4	12193.4	14481.9	16702.7	18361.5	17068.5	252108
1969	10341.6	12710.2	22900.1	67756.3	69342	43386.2	40520.8	39771.9	23200.5	16753.1	15273.7	16275	378231
1970	13894.9	14581.7	48702	71800.8	62325.2	35417.3	10603.8	13434.5	13931.1	19072.8	19797.5	16452	340013
1971	10437	18171.4	47205	43213.1	30495.1	37401.4	21182.7	27561.5	21507	22400.7	19590.4	15938.3	315104
1972	11787.6	11894.7	17538.4	19817	21908.5	29194.1	11850.3	13559.2	14320.3	17573.6	19818.9	16621.2	205884
1973	12078.8	19419.6	22728.8	54124.6	60366.7	44696.3	19064.4	15061.3	18823.3	21602	19151.3	16135.7	323253
1974	12714.3	44591.2	53383.4	69599	40292.1	65205.3	54983.9	22086.5	19706.7	20848.1	18831.6	15446	437688
1975	14635.9	13980	17684.8	18133.5	49843.8	57296.8	25919.6	26659.1	22136.7	17888.7	18850.5	13995.8	297025
1976	18943.9	15575	17241.2	17244.4	13588.9	16884.3	8906.4	9717.7	8673.3	7385.2	14388.9	11066.6	159616
1977	6792.3	6449.9	6326.3	9623.2	12565.1	12702.6	7897.6	6935.3	10893.9	7369.3	7087	6926.2	101569
1978	6248.6	6091.8	14057.7	46425.5	41671.2	53126.4	35894.2	20146	15374.3	18331	19767.2	14624.4	291758
1979	10119.7	11925.7	17172.4	21891	29840.3	28748.3	17341.5	12700.8	19344.2	17591.2	16115.6	14318.4	217109
1980	11182.2	14498.6	18830.7	62588.8	73210.6	42239.7	19717.5	15836.8	13955.7	15603	19635.9	12126.5	319426
1981	11254.1	9758	16987.9	20770.8	25577.7	23978.1	16147	10997.5	8541.1	7970.3	13537.7	13516.5	179037
1982	9842.3	35826.5	66468.7	57846.3	69708.9	53709.2	70947.1	32718	20492	18218.7	17535.1	18911.4	472224
1983	17492.7	33557.2	54833.2	57090.1	76493.5	65958.3	52252.6	49438.9	47667.3	24867.6	20625	24937	525214
1984	18239.5	56670.9	71462.5	49327.2	35532.2	28791.3	15693.8	14493.3	16658.2	20608.4	19328.5	15787.4	362593
1985	11929.7	27741.6	23935.3	16192.5	17167.5	15494.6	11118.6	12044.6	11030.5	10176.3	11753.8	12824.9	181410
1986	8463.1	10650.4	16668.7	19552.6	83451.2	68740	22015.4	13644.5	11806.9	20756.9	19377.9	14909	310037
1987	11443.2	9673.1	17160.9	17250.3	19603	23523.8	9851	9649.5	8634.3	8565.1	7742	8291.7	151388
1988	8004.3	7341.9	16531.9	24876.1	13426.5	10476.1	8967.1	9347.8	8604.2	7472.7	8384.9	10459.9	133893
1989	7958.6	9892.1	9698.1	11754.2	11005.5	40191.1	23495.3	12860.3	12339.8	11099.1	10050.9	13242.9	173588
1990	11659.5	9709	10624.3	19496.8	15851.4	15562.8	11247.2	9401.4	10562.3	8849.5	10249.2	10817.2	144031
Avg.	11032.5	14912.1	24150.9	31159.5	36978.3	32239	23187.3	18598.3	16513.1	15361.5	15450.9	13773.7	253357

Run Date 1- 4- 99
Sacramento River flow below Freeport
TRN_RSP6 = PROSIM99;TRINITY R EIS/EIR STATE PERMIT ALT;C09A;BDPA;1993 WRBO;L2 RE
Equation is +flow 17
Report is in ascending order by year Units are in CFS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	11615.4	11405	16867.6	17043.1	31037.4	28152.6	20804.8	41586.9	34504.5	17376.8	19089.2	14993.5	264477
1923	11467	15249.9	27259	30228.1	15827.1	14586.5	22987.9	15430.1	14980.9	20431.9	18152.1	16462.9	223063
1924	11984.8	10638	17212.3	16164.5	15927.6	12208.5	6687.6	7663.4	6756.7	7461.5	6782.9	6729	126217
1925	7831.1	7265.3	11735.7	11176.3	47726.5	26806.5	22550.7	13926.1	14099.9	17348	14443.4	15748.5	210658
1926	10295	9498.6	12029.3	17371.1	35486.9	15152	18571.3	15404	12917.8	13400.3	8416.8	12044.6	180588
1927	8631.6	22767.9	21025.1	35598.7	73460.7	40498.2	44211.1	24044.1	16302.8	18416.3	20297.4	15181.7	340436
1928	12573.3	22682.6	15852.7	24792.1	24138.3	66900.6	25834.7	19588.8	14020.8	17417.2	18334.7	15123.6	277259
1929	10489.4	11550.3	16604.3	16970.4	15423.1	11957.7	7386.7	9244.1	11221.1	12864.2	9263.2	8465.1	141439
1930	7260.7	6643.1	15732.8	20546.6	16603.2	27760.3	12230.8	10743.5	10186.7	12872.5	10915.4	14394.1	165890
1931	8248.4	8533	11431.6	13764.2	13154	10407.4	10559.5	8382.7	7058.5	7121.3	7058.3	7130.4	112849
1932	6145.6	6341.6	17230.5	19459.2	13542.7	10824.1	9577	11960.2	14553.2	13049.8	11389.3	12807.7	146881
1933	8096.5	7631.4	11930.6	14179.6	12760.8	12463.6	13005.2	8487.1	11061.7	9838.4	8199.5	7597.4	125252
1934	6883.1	6338.6	13493.9	17012.5	13461.2	13466.9	10279.7	8228.6	9439.8	7843	7662.8	8099.5	122210
1935	6343.5	10675.3	9500.1	25283.5	12430.7	24033.2	42019.2	31030.1	15480.2	16409.5	19219.8	15635.8	228061
1936	11637.1	10852.3	16917.4	34978.7	55552.2	29441.8	19631.7	14581.5	14418.3	18624.6	18809.9	15563.6	261009
1937	9839.4	10674.8	16574.2	13573.9	29891.2	37844.3	20894.9	17785.2	14534.5	14717.6	18887.1	15629	220846
1938	9945	23174.6	45351.6	29720.3	68206.9	69658	52353.9	50162.4	37553.8	17629.1	16782.1	16008.1	436546
1939	16554.7	13606.7	15537.8	14754.4	13638.2	12987.1	9573.4	9634.2	10679.3	12737.6	10352.8	12933.3	152990
1940	7830.6	7804.4	11681.7	27452	58287.9	66672.7	50955.4	17855.8	12660.2	17774.3	18467.5	14586.4	312029
1941	9242.1	11869.1	41798.8	61145.8	69671.9	58431.3	51846.1	38723.8	21053	15351.5	15300.2	15606.4	410040
1942	15151.5	15025.7	52676.2	57354.2	73705.9	24000.1	41881.7	36409.2	27943.6	15720.5	15698.8	14493.7	390061
1943	14608.3	19740.5	29092.2	58279.8	46855.3	57820.1	27610.5	18431.9	11883.9	15684.6	19611	15224.2	334842
1944	11597.5	11709.8	16491.8	16602.4	24395.4	20423.7	9939.5	10232.2	14760.6	16073.9	12752.5	14071.5	179051
1945	9250.4	15629.4	18752.7	14201	45739.1	26294.7	11866.4	12168.6	16687	16436.1	18190.4	15406.3	220622
1946	9540	18664.1	51315.9	45535.3	27607.3	17077.1	12812.4	15140.7	16459.1	20485.9	18076.6	16107.6	268822
1947	10543.2	11609.7	15867.9	15587.1	17715.4	18793.4	16125	10374.6	12636.9	12960.6	9811.5	11924.8	163950
1948	9171.4	10470	8752.6	15815.7	12445.3	16203.7	29890.6	30653.1	21858.1	20764.7	18294.2	14219.7	208539
1949	10961.1	11712.9	16949.2	15614.6	12474.9	39821.2	13041.7	13144.6	14783.5	14806.2	11560.6	13015.4	187886
1950	9171.7	9747.3	9717.9	20985.6	32906.7	21890	18519.1	16656.6	16320.4	18701.6	17070.2	14130.4	205818
1951	13554.5	44348.5	63582.8	54708.6	54411.7	31880.9	17254.1	17780.5	14609.3	19680.9	19601.1	16550.3	367963
1952	10691.8	17839.1	41700.5	58790.7	60009.7	50335.7	53375.6	52166.1	40395.6	22031.3	19308.6	16786.4	443431
1953	14737.6	13406.3	39871.4	62759.4	24935.8	22471.4	17236.9	25598.2	28697.3	17135.8	17934.8	15849.2	300634
1954	15028.6	20078.2	14942.2	33969.9	51145.9	45741.4	39077.3	23710.5	14210.8	18325.9	19212.5	15102.2	310545
1955	10956.7	17456.5	24919.6	18889.2	15852.7	11884.5	9866.4	11751.1	16107.7	14776.5	11736.3	13711.6	177909
1956	8947.9	10893.2	62884	70927.1	60639.5	35613.6	21127.3	39482.5	24034.9	17762.8	18096.3	16623.8	387033
1957	18020.1	12102.5	11741.3	16250.4	35016.6	43027.5	19975.1	16201.4	16734.5	19170.8	19585.6	16125.9	243952
1958	21487.5	16921.3	24676.7	37507.2	73883.1	62312.2	60976.9	40564.6	37554.5	19337.4	18850.7	19391.7	433464
1959	14637.5	12140.9	12381.5	37902	44953.9	21464.4	12635	14531.1	14509.3	15756.6	18080.5	14203	233196
1960	11957.9	11242.5	17670.7	16064.4	27621.2	20435.7	16198.4	11078.4	12851.8	15581.8	11764.7	12650.5	185118
1961	8986.6	12930.2	20034.6	12892.9	33022.2	18552.6	13639.8	11992.6	13139.5	12823	9802.7	11472.4	179289
1962	8384.4	9118.5	17751.7	12148.1	46594.2	30762.9	14444.1	17930.5	14171.7	16014.8	18556.6	14896.8	220774
1963	33495.2	16558.7	27603.4	15791.3	57070.4	29144.6	62363.2	29468	15423.6	17788.3	20303.5	14715	339725
1964	16104.3	28071.6	13974.4	26777	15557.8	13121.1	11931	13070.1	13731.5	15817	11548.5	11851.8	191556
1965	8799.6	15166.7	62867.7	68255.9	31738.7	21468.7	43691	23821.6	13605.5	15084.6	19051.4	12542.9	336094
1966	10622.9	25881.5	16486.4	32211.6	23859.6	24285.1	15096.5	17969.1	14309.9	15083.3	17671.7	14314.6	227792
1967	11374.8	18551.1	36322.7	38104.2	47804	47179.9	37388	42527.8	41350.8	19873.7	18218.8	17058.4	375754
1968	15348.1	13235.1	15298.3	29955	52994.3	35638.5	15377.5	13440.2	14459.7	16103.9	17906.4	15391.1	255148
1969	11730	13168.1	25608	69011.9	69703.6	42811.1	41711.3	41728.5	26693.6	16948.6	17597.9	18395.6	395108
1970	16405.3	14318.8	49768.9	70029.2	62315.3	35204.1	13413.1	11612.5	14522.3	19965.1	19596.8	15780.6	342932
1971	10615.9	25728.9	48602.8	43883.8	30291.6	41090.8	20996.6	28627	24271.8	17939.2	19887.1	15492.7	327428
1972	14692.5	13746.5	22237.3	21820.7	21777.9	32409	14967.4	14201.9	14551.6	16473.6	17815.4	14616.3	219310
1973	11874.2	23161.1	24938.8	55928.3	60650.1	45390.4	16941.1	17732.3	16218	19381.5	19430.7	16182.1	327829
1974	15236.9	50373.2	55493.8	68812.2	41158.4	66791.2	55525	23970.7	22911.8	21118.3	19787.4	19732.8	460912
1975	14668	13443.2	17274.9	16708.8	51895	58442.9	22533.5	30837	26902.9	18238	18631.5	17837.6	307413
1976	19644.1	15759.8	14990.6	13771.2	13308.3	14521.3	9893.1	10201.6	10389.4	15248.2	9889.2	11866.8	159483
1977	7860.8	7254.2	7255.2	9442.7	15074.6	11442.8	7641.4	7119.3	6892.3	7176.9	6412.8	6731.4	100304
1978	6174.5	5833.1	13221.3	49898.3	45986.5	54060	36445.4	19282.3	15072.8	13035.4	18824.4	13113.1	290947
1979	10164.6	11418.1	15120.4	21442.6	35952.7	30377.2	15359.2	14612.4	19381.9	16857.4	19030.7	16581.9	226299
1980	11925.3	16750.6	20067.1	64672.5	73919.1	43405.1	18246.1	14016.8	13075	14252.7	16345.3	12765.7	319441
1981	12326.6	9805.6	16592.5	28692.9	26317	29124.9	13111.8	10007.7	12385.9	12599.9	12370.3	14034.4	197370
1982	8965	40873.2	65053.8	58481.4	69588.7	58046.3	71910	34272.8	23731.6	18678.5	19567.5	20722.6	489891
1983	21668.9	33563.6	55121.5	57482.6	76542.7	66861.9	52890.7	50166.3	48195.4	25547	21353.7	26626.5	536021
1984	18425.9	53162	71257.8	49544.6	33366.9	32109	16123.7	11162.1	16105.6	19111.4	19427.2	15465.3	355262
1985	13294.2	31586	24937.8	15287.4	14791.4	15870.7	12121.1	13285.8	13389.6	14936.4	10423.5	13501.4	193425
1986	8500.3	10049.7	15795.8	19401.4	82614.3	70607.9	20728	12173.3	11658	12126.9	19340.1	14832.3	297828
1987	10772.1	8860	16907	17405	19088.7	22971.5	13146.4	10127.3	12942.1	11836.7	9535.1	8963.7	162556
1988	7951.7	7797.5	16080.8	24885.8	11801.1	11237.2	9738	9082.1	11589.6	13033.4	8819.9	9843.5	141861
1989	7542.8	9908.6	9559.8	11721.1	10666.4	42866	21314.4	14587.3	14423.7	14689.8	10617.2	13412.1	181309
1990	9960.8	8171.9	9111.5	18554.3	14575.6	12191.1	15281.6	10842.8	13318.4	14798.2	10167.9	10740.5	147715
Avg.	11832.5	15944.8	25001.3	31477.9	37225.7	32401.9	23990.5	19861	17468.7	15977.7	15521.6	14287.1	260991

Attachment 2

Summary of Water Quality Data for the Spring Creek Debris Dam, January 3, 1996 through January 31, 2000

Water Quality Data
Spring Creek Debris Dam

PREPARED FOR: Rick Sugarek/EPA

PREPARED BY: John Spitzley/CH2M HILL

EPA WORK ASSIGNMENT: 025-w6-0036

DATE: February 7, 2000

This technical memorandum provides a summary of water quality data for the Spring Creek Debris Dam (SCDD) discharge compiled for the period January 1, 1996 through January 31, 2000. The U.S. Bureau of Reclamation (Reclamation) conducts weekly sampling of SCDD discharges at the SCDD outlet works and tests the samples at the Reclamation testing lab located near Keswick dam. Reclamation has provided this data to EPA. CH2M HILL has compiled the data in conjunction with an EPA work assignment (WA 25) for the Iron Mountain Mine project.

Water samples obtained from the SCDD outlet are tested for pH, total copper, and total zinc. Because of the low pH, the total copper and zinc concentrations are typically equal to the dissolved concentrations. As shown in Table 1, metal concentrations discharged from SCDD vary as a function of flow into Spring Creek Reservoir. During low inflow conditions, typically from June through November, inflow into the reservoir is less than 50 cfs. During these periods the SCDD discharge has an average pH of 3.86 and has total copper and total zinc concentrations equal to 0.72 mg/l and 1.29 mg/l. During higher inflow conditions, above 50 cfs, the SCDD discharge has an average pH of 4.38 and has total copper and total zinc concentrations equal to 0.41 mg/l, and 0.63 mg/l.

TABLE 1
Water Quality Data : January 3,1996 through January 31, 2000
Spring Creek Debris Dam

	pH	Total Copper (mg/l)	Total Zinc (mg/l)
SCDD Inflow < 50 cfs			
No. of Samples	167	160	160
Max	4.80	1.45	4.36
Min	3.00	0.22	0.44
Avg	3.86	0.72	1.29
SCDD Inflow > 50 cfs			
No. of Samples	49	50	45
Max	5.00	1.12	1.73
Min	3.60	0.10	0.09
Avg	4.38	0.41	0.63

Attachment 3

Transcripts

PC-1

0001

US DEPARTMENT OF THE INTERIOR
US FISH AND WILDLIFE SERVICE
---o0o---
PUBLIC HEARING
regarding
ENVIRONMENTAL IMPACT STATEMENT/
ENVIRONMENTAL IMPACT REPORT
FOR THE TRINITY RIVER MAINSTREAM FISHERY RESTORATION
---o0o---
Holiday Inn
Appaloosa Room
1900 Hilltop Drive
Redding, CA 96001
1:00 p.m. and 6:00 p.m. Sessions
Tuesday, November 16, 1999

CLIFFORD M. FISHER CSR NO. 2727

0002

PRESIDING:

ROBERT RUESINK, Supervisor
US Fish and Wildlife Service
Snake River Basin Office
Boise, Idaho

APPEARING:

MARY ELLEN MUELLER
Fisheries Supervisor
US Fish and Wildlife Service
California/Nevada Operations Office
2800 Cottage Way, Room W-2606
Sacramento, CA 95825

MIKE RYAN, Manager
Northern California Area Office
Bureau of Reclamation
Shasta Lake, CA

MIKE ORCUTT, Director
Natural Resources Program
Hoopa Valley Tribe
Hoopa Valley, CA

CHRIS ERICKSON, Supervisor
County of Trinity
Hayfork, CA

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TRANSCRIPT OF PROCEEDINGS

PRESIDING OFFICER RUESINK: Good afternoon. On behalf of the United States Fish and Wildlife Service, I would like to welcome you to this public hearing.

The US Fish and Wildlife Service, US Bureau of Reclamation, Hoopa Valley Tribe and Trinity County are conducting a joint process for taking comments on the draft Environmental Impact Statement/Environmental Impact Report for the Trinity River mainstem fishery restoration.

My name is Robert Ruesink. The last name is spelled R-u-e-s, as in Sierra, i-n-k. I'm the supervisor for the Fish and Wildlife Service Snake River Basin Office in Boise, Idaho.

And I will be serving as the presiding official for this hearing.

At the front table with me this afternoon are representatives from some of the other agencies, Marianne Mueller --

DR. MUELLER: Ellen.

PRESIDING OFFICER RUESINK: I beg your pardon.

-- from the US Fish and Wildlife Service, Chris Erickson with the county Board of Supervisors, Mike Orcutt with the Hoopa Valley Tribe, and Mike Ryan with the Bureau

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of Reclamation.

Other representatives of the US Fish and Wildlife Service are at the registration table. And they will be happy to answer questions and give you some additional information.

I saw there were copies of the Environmental Impact Statement on that table. So please feel free to visit that information table and ask them questions or get additional information from them.

At this point I'd like to introduce Mary Ellen who will make an additional comment.

DR. MUELLER: Good afternoon. Thank you for coming out on this rainy day.

As he said, my name is Mary Ellen Mueller. I'm the Fishery Supervisor for the California/Nevada Operations Office of the Fish and Wildlife Service.

Release of the draft Trinity River mainstem fishery restoration Environmental Impact Statement/Environmental Impact Report is the latest step in a process that Congress initiated several years ago to address long-standing concerns about the effects of water diversion, in-stream habitat, sedimentation and water management issues on the Trinity River system's health, including its once abundant salmon runs.

Congress directed the Secretary of the Interior to

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evaluate the impacts of these issues and to take steps to restore the health of the Trinity River system.

In response to this congressional mandate, the Department of Interior has been actively participating in a study for more than 15 years.

This has been a collaborative effort led by the US Fish and Wildlife, the US Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County.

The EIS/EIR summarizes the research that has been undertaken over the past several years and identifies for public comment several potential alternatives for restoring the Trinity River system.

Impacts considered under NEPA and CEQA are not limited to impacts to the fishery resources of the Trinity River, but include all impacts of the action affecting the human environment.

The department encourages public comment on all aspects of the draft EIS/EIR. This public hearing is part of the comment process on that draft.

It will be closed to public comment December 20th, 1999. A Record of Decision is expected in the early spring of the year 2000.

On behalf of the Fish and Wildlife Service, the Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County I thank you for the effort you have made to attend

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this meeting and also thank you in advance for your comments.

Now I'll pass it on to Chris Erickson. And he can introduce himself.

MR. ERICKSON: Hi. I'm Chris Erickson. I'm a Trinity county Supervisor and the designated representative of Trinity County to listen to the comments that are made here.

Trinity County will be holding a public hearing before the entire board on December 7th over in Weaverville.

Mike?

MR. ORCUTT: Good afternoon. My name's Mike Orcutt, here representing the Hoopa Valley Tribe. And I just had a couple of kind of kind of brief I guess comments.

The Hoopa Valley Indian reservation is located on the lower Trinity River. It's about 90,000 acres of land that's managed for the sole benefit of the membership of the Hoopa Valley Tribe.

We have about 2200 members. The tribe owns federally reserved -- or not owns, but they have federally reserved fishing rights and access to the anadromous fishery resources of the Trinity and Klamath rivers.

The Hoopa Tribe has been in existence or it's

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documented well over 10,000 years. The fish and wildlife and related resources of the Trinity River Basin have been essential to the survival of the people, both historically and contemporarily.

And I believe one of the I guess real issues here is the status of the resource is one in which Coho salmon are listed in the Klamath and Trinity rivers as a threatened species under the Endangered Species Act. It's likely that steelhead trout will be listed as a threatened species under ESA.

And as has been stated already, as well as in the information that's before the public, Congress has responded by saying something needs to be done. The Congress has enacted the Trinity River Restoration Program in 1984, CVPIA, which mandated the Secretary to do something in terms of extreme flows, are all responses by Congress.

In addition, there's a federal trust responsibility to protect those reserve rights, fishing rights of Hoopa Valley and Yurok tribes.

So today, as already stated, we're here to gather public information.

I would add one last comment in saying that in terms of development of the document, it was a unique partnership in which an Indian tribe participated in the

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development of a federal document. And I believe that's unique within the country.

And again we're just here to -- and also thank you in advance for your comments.

MR. RYAN: Good afternoon. My name is Mike Ryan. I work with the US Bureau of Reclamation. I'm the Northern California Area Manager. And the Trinity River division is one of the group of features and facilities that I help manage.

I also welcome you here this afternoon.

PRESIDING OFFICER RUESINK: Thank you for your comments.

Public comments, as you've already heard, on the draft EIS/EIR will be accepted until December 20th, 1999. After review and consideration of these comments, the four lead agencies that you've seen represented here, along with the cooperating agencies, will compile the information necessary for preparing a final Environmental Impact Statement/Environmental Impact Report.

The purpose of this hearing is to receive your comments on the draft EIS/EIR. Comments on all aspects of those documents are very important and will be carefully considered.

Because of the importance of the comments, it is necessary that we follow certain procedures here this

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afternoon.

If you wish to present comments at the hearing, please register at the table where you entered this building. You will need to fill out an appearance slip that looks like this (indicating). And when you register, indicate if you're representing an organization or an agency.

When you are called to present your comments, please come forward to the microphone in the front, begin your presentation by stating your full name, spell it for the record, and at that time indicate if you represent an organization.

This is an informal hearing and therefore you will not be questioned or cross-examined in connection with your comments.

Your comments or questions are being recorded by the reporter to preserve a complete administrative record of the statements and comments given here this afternoon. Please keep in mind that the reporter will not record any statements from the audience or which are made to the audience. Comments must be addressed to the microphone and to the people at the front table.

If you have a copy of your written statement, please leave it with the court reporter to ensure accuracy in getting that into the record.

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If you are reading your testimony, it will be helpful to read it slowly so that the reporter is able to record verbatim a copy of your comments.

If you would prefer to give us written comments on these draft documents, that is acceptable. Written comments may be submitted today to the staff at the registration table.

Or I'll give you an address. They may be mailed to Mr. Joe Polos, P-o-l-o-s, at the US Fish and Wildlife Service, 1655 Heindon, that's H-e-i-n-d-o-n, Road, Arcata, California 95521. And that address is also at the registration table.

Written comments will be accepted through December 20th, 1999. They will be given the same consideration as any oral comments that are given here this afternoon.

At this time we are ready for our first speaker. Mr. Sid Mickelson, would you please come to the microphone, state your name, spell it for the record, identify if you represent anyone and begin your comments.

MR. MICKELSON: All right. Thank you very much.

I wasn't sure really what the meeting entailed, so I came in just to basically find out.

My name is Sid Mickelson, S-i-d-n-e-y, Mickelson, M-i-c-k-e-l-s-o-n.

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Do you want the address? P.O. Box 429, Douglas City, California, Zip Code is 96024. Phone number is (530) 623-4985.

One of the problems I have, we've been studying the Trinity River for quite awhile. And I know there are many other rivers in the nation and so on that you people cover, so it -- but to me, it's very important.

I live along the Trinity River, about a mile east of the Douglas City bridge. And our main problem is the Indian Creek outlet of Indian Creek which is dumping, oh, tons of sediment, up to ten/12 inches in diameter. And it's like concrete.

But it has built a large like a dam in front just west of Indian Creek itself, which in turn holds a bunch of decomposed granite above it which could be relieved. That would all wash out, with the exception of the dam. It wouldn't let it.

And when they cut some of the trees, et cetera, all it does is broaden the flow. But it reduces the amount of water that can be -- flow out through the Trinity or the channel itself to flush the sediment out of there.

So the excess sediment that does come out of Indian Creek, I live a mile south of -- or west of Indian Creek. And it -- it just fills it up. Our -- the water table now from the ground up has come up roughly four feet.

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We used to have a nice fishing area, water was like six feet deep. So now all we have is an island with water going through it.

It's a nice -- still good for salmon. The only problem is if they increase the flow of the Trinity River up to the 32,000 cubic feet a second -- and I can't -- I can't find out yet how much flow is going to come through there -- flowing the water through isn't going to work.

When I first got the property in '76, we could handle the 32,000 cubic feet a second. Now I don't think we can handle 20,000 cubic feet a second without possibly being flooded.

Proposals have been -- come up to elevate our houses, move the houses closer to the highway, et cetera. That -- that doesn't seem reasonable when the river itself could be fixed and we could have the salmon. It used to be one of the best salmon areas in the state.

So -- however, in regard to your shortness of time and all, I will write some comments and direct them to you, just in courtesy to others. And I appreciate having some review to the Trinity itself.

So far the -- we have an agency of the TCC -- or it was formally known as the TCC committee to the task force. And --

However, I think it falls on deaf ears. I don't

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see that -- the task force either doesn't acknowledge the TCC for the comments that are made or submitted --

I have had a problem with Lester Snow in the past, coming to Redding here on a meeting where he wasn't interested in the water of the Trinity. He said that's in another watershed.

However, the one million acre feet a year, he was interested in that okay. In essence, he had recognized Whiskeytown. And I don't know where he thought that water came from.

It just sort of -- I've become very frustrated because I don't see anything done. Millions of dollars being spent, but I don't see any work. So any work that's tied into -- or any monies that are in for studies, eventually some work should come out of them. People retire after years of studies, including the Indian Creek Basin. And I'll get into that in the letter.

But that was formulated to have a catch basin at Indian Creek roughly 25 years ago. However, all the studies have been made in the past and nothing has been accomplished. I feel sorry for the government employees that work hard doing what they're doing to find nothing being done. That's shameful.

I thank you.

PRESIDING OFFICER RUESINK: Thank you for

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your comments.

Our next presenter is Steve Fitch. Would you please come to the microphone.

MR. FITCH: I'm Steve Fitch. And I'm representing Assemblyman Dickerson, Dick Dickerson. I also was a member of the Trinity River Task Force or several years.

First of all, I want to thank you for bringing this hearing to Redding where people will be greatly affected by these decisions.

Our comments are going to be short, because of -- we received the EIS five days -- five working days ago. We really haven't had a chance to do an in-depth review of the report.

In fact, we were in disbelief when we heard that you were only going to allow 47 days for the public to review and comment on a study that took about 17 years and affects a wide area of northern California.

I've managed over three -- three million acres of national forest land across the country: Florida, North Carolina, California. And I can tell you that 45 days is what we consider the minimal review period for the most minimal, non-controversial projects. So you can imagine the surprise.

We -- Assemblymen have previously requested that

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you give the public at least 90 days for review, and hopes you'll extend to us this courtesy.

Next we hope that you will fully develop the array of alternatives between now and the final draft to include more innovative uses of, first, mechanical methods, and then peak flows and/or flood events to restore the Trinity River.

You need to look at increasing water yield by reducing vegetation to natural stocking levels. I would venture a guess that if you looked right now at the change in water yield in the 120,000 acres that burned recently, you would – you could anticipate a great increase in water yields in that lower watershed. We have stocking levels of vegetation that are not anywhere near natural throughout – throughout the drainage. That needs to be addressed in your final report.

We suggest that you address the impact of these flow changes and drawdowns to the recreation and economic benefits of all three reservoirs in the national recreation area.

Finally, we suggest that you fully integrate ways to mitigate the losses of power – water and power in the Central Valley by improving existing or adding new off-stream storage facilities.

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Thank you.

PRESIDING OFFICER RUESINK: Thank you for your comments.

Our next speaker is Patrick Mintum.

MR. MINTURN: Yes. Thank you. That's Patrick Minturn, M-i-n-t-u-r-n. And I'm the Assistant Director of Public Works for Shasta County.

Our concerns with the subject document are that basically it's been optimized for the needs of the Trinity River Basin, including the socioeconomics of the basin, with very little concern for the Central Valley.

The benefits of the Trinity Project are, in rough order of priority: Power, water, recreation and flood control. With power and water both being massive benefits, according to the document.

The proposed alternative would significantly impact power, power yield, also water supply, including all the environmental benefits of that water within the Central Valley, but with very little concern within the document for those impacts.

It seems that there's been far more concern for maintaining the benefits of the project within Trinity County, particularly flood control issues.

We feel that there is the potential to optimize both systems through an alternative that provides for

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sharp peaks, more flushing flows of short duration, and more mechanical work to reshape the channel, and optimizing the amount of water to show that it's being efficiently used within the channel.

We're afraid that as proposed, this project may very well drastically impact power and water supplies while not accomplishing its goals within the Trinity River Basin.

If the Trinity benefits of flood control continue to be optimized for the Trinity Basin, we're afraid that the flood control function is largely incompatible with the other goals of the study.

Thank you.

PRESIDING OFFICER RUESINK: Thank you.

Our next speaker is Bob Madgic.

MR. MADGIC: Yeah, that's Bob Madgic, M-a-d-g-i-c. I didn't put down Shasta Fly Fishers, but I am a representative of that organization.

And I realize that your decisions are probably going to be based on some legal issues, the Endangered Species Act being very controlling here.

In the original legislation mandating that the Central Valley Project, which lead to damage to the Trinity River, and the subsequent relocation of 90 percent of that water to the Central Valley, not be detrimental to

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the Trinity River fish and wildlife.

I'd like to say I'm fully supportive of this document. And I'd like to just speak just in global terms.

I have a hard time understanding how anyone can argue that it was right and responsible to have 90 percent of the water from the Trinity Basin and the Trinity watershed shipped somewhere else.

I just don't think that is a tenable position legally, ecologically or any other reason, environmentally, socially and so forth.

I think the only thing that would compare as far as that particular action would be when Los Angeles Department of Waterworks went to the eastern Sierra and shipped at least that much water south in order to build Los Angeles, meanwhile rendering the eastern Sierra rife of any kind of water. And legal action redressed that.

It's time to redress this issue.

PRESIDING OFFICER RUESINK: Thank you.

Our next speaker is Julie Rodgers.

MS. RODGERS: Good afternoon. I'm here representing State Senator Maurice Johannessen, J-o-h-a-n-n-e-s-s-e-n. My name Julie Rodgers, R-o-d-g-e-r-s. I'm his field representatives here in Redding.

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A couple of things. First, the comment period review and getting back to give thoughtful and intelligent comment really is not lengthy enough. You have had the resources and budget behind you to draft these proposals without the public having same. And we would like a greater consideration for that fact, as well as the notification process. Our office again, though promised, was not notified until this morning of this hearing this afternoon. And so we would like to see that more consideration is given to the public officials, those that are concerned with these issues, prior to a hearing such as this. This is a very important issue. We're talking about people's lives, livelihood, the environment in our communities. And so we would like to see more consideration there. Senator Johannessen has also requested in the form of actual questions, if these could be in the next review addressed. One is the exact amount of water that you now expect to be diverted from the Trinity River, and for what specific purposes and under what specific conditions the water would be diverted. Secondly, is the Department of Interior planning on making an assessment of damages to the specific areas of

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power generation, water users and impact on the fisheries which we all realize is delicate. And we've been, I mean, fighting constantly back and forth as far as the health and good habitat for the fisheries. So we could ask consideration for those. Thank you.

PRESIDING OFFICER RUESINK: Thank you for those comments. Our next speaker is Tom Weselow.

MR. WESELOW: Hi. I'm Tom Weselow with California Trout --

PRESIDING OFFICER RUESINK: Before you start, Miss Rodgers, did you have a copy of your presentation that you could leave with the reporter?

MS. RODGERS: I have a copy of these questions, not on the comment period and review. But yes, I do.

PRESIDING OFFICER RUESINK: Okay. That would be helpful, if you could leave those with us, please.

MS. RODGERS: Sure.

PRESIDING OFFICER RUESINK: I'm sorry. Go ahead.

MR. WESELOW: Hi. I'm Tom Weselow, the North Coast Manager for California Trout. California Trout represents over 5,000 individual

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members and an additional 5,000 affiliate club members. My office is in Humboldt County, where I also reside. And therefore, not only do we have a large statewide interest, but I also have a local interest, in being a resident of Humboldt County and somebody that spends lot of time on the Trinity River. The Trinity River Act of 1955 specifically mandated that fish and wildlife not be harmed. I don't think anybody's going to be able to get up here in front of you and say that that is, in fact, what has taken place. We know that fish and wildlife have been harmed and we have lots of evidence through the declines of -- of especially our fishery populations and subsequent listings under the federal Endangered Species Act. And we know we need to do something about this. The water has been diverted, water that is rightfully belonging to the Trinity River, to the Central Valley at an excessive rate since the dams were put in, even though the act specifically stated that we would not do harm to these fish and wildlife populations. What we've really seen is evidence of a transfer of wealth from our local economics, from our salmon in the river, from our healthy fish and wildlife populations, to the Central Valley. And there was no legal right to do so. And the

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legal right to keep the water in the river has not been fairly addressed. And we are very glad that you are finally getting to the point of doing this. We are very disturbed that the cons -- over the constant delays and inability to meet time lines on this issue. This decision was to be made by the Secretary in 1996. It's now 1999, and the Secretary will not make the decision this year. Although I don't hold any of you up there personally responsible, and I know a lot of you have come on board after a lot of the problems, and deadlines weren't met, I do appreciate the fact that you have finally gotten the flow evaluation study out and the EIS/EIR out. And I encourage you to do whatever you can to expedite this process while still staying within the legal guidelines of NEPA and CEQA. And I do not believe we need any more time extensions, any more delays. We need a decision. Those fish have been suffering for 40 years, and we need to have that decision now for the health of our fish, our river and our economies. So I would really encourage you not to make any more delays or any more additional comment periods, more

studies. Let's get this wrapped up and finalized. You've done a good job with your EIS/EIR and flow evaluation. Cal Trout supports the maximum flow alternative. And in our opinion, if there is anything less than the bare minimum of the preferred alternative, you're leaving yourselves open to litigation and breaking the law and mandates that Congress has set forth for the Trinity River. So we really encourage you to keep this process going and allow the Secretary to make a timely decision. And I want to thank you for allowing the people to get up and give their two cents on what needs to be done. So thank you and please keep this going in an expeditious fashion.

PRESIDING OFFICER RUESINK: Thank you for those comments. Our next speaker is Jim Feider.

MR. FEIDER: Thank you and good afternoon. My name is Jim Feider. And I'm the electric utility director for the City of Redding. And I'm speaking on behalf of the City of Redding in its entirety today. The City of Redding is a CVP customer both for water and power. And the proposed action that you're considering and taking comments on here today will have a significant

impact on the City of Redding and its citizens. Redding will be providing written – formal, written comments submitted for the record, but I would like to highlight our concerns here today. First of all, along with the others, a few of the former speakers, we are requesting an extension of time. We're looking for an extension of at least 90 days. As has been stated, this process has been in the work for a number of years. I believe Department of Interior's press release announcing this meeting indicates that it's been 15 years of study and several years of developing the EIS. And it is unfortunate it's taken this long to get to this stage. But now that we are here, to have adequate public comment, we need more time. I would point out for the audience and also for the panel that the – we have brought the draft EIS with us, including the appendices. They're sitting over here on this box to my left (indicating). The Trinity River document itself with its appendices is about a foot deep with about six or eight appendices. Located next to it on the left is the CVP Improvement Act EIS. And it's similar in scope. And we think the complication of these issues

suggest more time for review. And, in fact, the mayor of the City of Redding has sent a letter to Secretary Babbitt requesting this. And I want to enter this in the formal record today. I have a copy for the reporter and for the chairman.

PRESIDING OFFICER RUESINK: Thank you. That will be entered into the record.

MR. FEIDER: Congressman Wally Herger has also submitted a similar request. And I have copies with me if people would like to see his request. Excuse me. I want to emphasize that the City of Redding wants to be constructive in this process in restoring the fishery in the Trinity River, but we think we need to take into consideration a number of items when assessing all of the impacts and moving forward in the most constructive way possibly. I alluded earlier that the Trinity River EIS needs to be integrated with what's going on in the CVP Improvement Act and the PEIS, that it's – I believe that it's tiered off of – from a NEPA standpoint, but we're still investigating that. The CVP PEIS, as it evaluates the operation of the CVP in its entirety over the course of dry years shows Shasta Lake, for example, being drawn down to a level of

five hundred – excuse me, 540,000 acre feet during dry years. When you compound that with the Trinity EIS, it looks like it would lower that level of Shasta Lake another 80,000 acre feet. Just as a point of reference, in the nineteen ninety si – excuse me, the 1977 drought, the lake was drawn down to about 560,000 acre feet. And this issue is covered in Chapter 5 of the PEIS. A lot of folks in Redding and the surrounding area that recreate on Shasta Lake can relate better to how many feet down from the top that is. As point of reference, in the Trinity EIS evaluation of the Shasta operation in dry year criteria, Shasta Lake would be drawn down 245 feet below the top. We think that is significant. And we're not suggesting that that is a Trinity impact alone, but we're suggesting that all of these water resources are an integrated system and it needs to have serious consideration. Moving on to the next point I wanted to highlight today, it has to do with harvest management. On page 2-38, the Trinity EIS states that the historical overharvest – excuse me, historical overharvest is believed to be partly responsible for the

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decline of some West Coast anadromous fish population was cited as a causation -- or causative factor in the decline of the southern Oregon/northern California evolution significant unit of the salmon.

And we have a cite here from National Marine Fisheries in nineteen seven -- 1997.

We believe that enhanced harvest management can play a critical role in the fishery restoration and should be implemented on a coordinated basis with habitat restoration and not left for some future possible consideration.

We are looking at some of the statistics on the Smith River, for example, that does not have any dams or diversions where the fishery has declined, and trying to make a correlation between what's going on in the Smith River and the Trinity River. And that's part of why we need more time to investigate.

The program costs of the preferred alternative are significant.

For implementation, the preferred alternative is shown in the executive summary to cost in the range of 72 to 116 million dollars through the year 2020, not including mitigation and ongoing other restoration projects?

The sources of funding for this amount of money

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are not spelled out in the document. If Redding is to pay these costs in addition -- in addition to the ongoing restoration efforts, these new activities would appear to add about $350,000 cost to the City of Redding its citizens alone.

That does not include the power impact costs. And I wanted to go into those.

The preferred alternative would, as you know, reduce the amount of water going through the Central Valley Project power plants at Carr, just on the end of Whiskeytown Lake, as well as Spring Creek and Keswick power plants.

CVP costs, being mostly fixed, will not be reduced.

Therefore, our customer costs will rise as a customer of the CVP.

The power costs shown in Appendix F reveal impacts for Shasta County of increased power costs on the order of a half a million dollars per year.

Based on our current and expected costs for northern California power market, Redding estimates that the increase in the -- in power costs to be double that, or about a million dollars a year.

So we think the document is -- understates the impacts significantly.

The price of power purchased in the California

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market is much higher than the estimated regional market cost delivered to the northern California loads. And for reference in the document, that's Table 7, Attachment F-1.

The price paid for power is market determined.

And the Trinity EIS approach only focused on a natural gas, state-of-the-art gas-fired generation.

It is not reasonable in this document to assume that individual customers of the CVP, of which there are 80, give or take, could replace the lost generation with new state-of-the-art gas-fired generation.

Additionally, a key assumption in the Trinity EIS is the cost of natural gas used in those replacement power plants.

The Trinity EIS relies on a delivered gas price of about $2.24 a thousand cubic foot. Gas prices even today are three dollars and more. And certainly, they won't go down over time.

And with the evolution of the indust -- the electric industry in the state of California, we would expect those gas prices to go up, not down.

Moving on to the last general topic, on fishery resources.

The Trinity EIS does not demonstrate any linkage between levels of flows below Lewiston Dam and fish populations directly. To get around this problem, it

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appears -- and again we're still reviewing the document -- it appears that a matrix style methodology of evaluation -- excuse me -- that a matrix methodology of evaluating various Trinity River attributes was employed.

Here also, it does not appear that there is any true linkage between the evaluation method mentioned above and the fish population goals shown in the Trinity River restoration program.

Embedded in the questionable methodology are certainly assumptions as to how things will work.

The following assumption drives home the point. If actions are made that move closer to meeting or meet the desirable system attributes, fishing production will increase.

And they may well increase, but we -- we are taking a look at the depth of the science. It appeared to us where the attempt was made in the document to maximize the habitat opportunities in the river without optimizing the whole system operation, including the Central Valley Project.

The Trinity River flow evaluation study tends to give one the impression that the Trinity River downstream of Lewiston has been in a managed drought situation. And we don't agree with that perception that's created in the

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document.

If you look at the flows downstream of Lewiston just in the last four or five years where there have been plentiful water in the northern California area, you would see that flows exceeded over a million acre feet in a couple of those years.

And we think that the document inappropriately characterizes much less than that.

In conclusion, it is readily apparent to Redding, that due to the number and severity of problems mentioned above, there exists a strong case for a 90-day extension of the comment period. This would provide a more realistic amount of time to work through these issues.

Again, Redding is supportive of restoring efforts on the Trinity River. However, they must be accomplished in a way that minimizes significant adverse impacts.

Two of the former speakers mentioned optimizing the river system by perhaps putting more emphasis on mechanical restoration and optimizing flood flows to restore the river.

And we're taking a hard look at supporting those type of approaches.

Thank you for the opportunity to comment here this afternoon.

PRESIDING OFFICER RUESINK: Thank for your

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comments, Mr. Feider.

MR. FEIDER: And I do have a written statement to leave for the reporter that --

PRESIDING OFFICER RUESINK: Thank you.

MR. FEIDER -- parallels my remarks.

PRESIDING OFFICER RUESINK: Our next speaker is Robert Knight?

MR. KNIGHT: My name is Robert Knight, K-n-i-g-h-t. I'll keep my comments very brief. I do not represent any groups.

Number one, my understanding of the original CVP legislation and the follow-on Trinity River authorization legislation was that one of the guiding principles was that there was to be no impact to the fisheries or wildlife.

The preferred alternative in the draft EIR/EIS, at least based on my understanding of it, targets a 66 percent fishery restoration, and it relies on rather extensive mechanical restoration.

I have some concerns there. Number one, mechanical restoration is expensive and funding for that is fairly iffy, whether it be federal, state or local. I mean, it's very difficult to get any kind of funding these days.

Number two, when you plan for failure, which is essentially what 66 percent of the target is, you're

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planning to fail, you most assuredly will fail. You will not reach your goal of -- or the mandated goal of full restoration.

I would request that in the final EIR, that the recommended alternative actually more closely matches the legislative mandates, i.e., full fishery restoration.

And lastly, due to the length of the projects that have been involved in the 15 plus years that I'm aware of, I don't believe that any more time for review than what you people have already stated is necessary.

People that are interested have been keeping up all along. And so I would request that no time extensions for review be given.

Thank you.

PRESIDING OFFICER RUESINK: Thank you for those comments.

Our next speaker is Roger Sherwood.

MR. SHERWOOD: Thank you. I just walked in. I heard about your meeting about ten after 1:00. I was dredging the Trinity River yesterday --

PRESIDING OFFICER RUESINK: Excuse me. Could you state your name --

MR. SHERWOOD: Okay.

PRESIDING OFFICER RUESINK: -- and spell it?

MR. SHERWOOD: I'm Roger Sherwood.

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And I was dredging in the Trinity River yester -- Saturday and Sunday.

I can also tell you where your salmon -- they're trapped at Burnt Ranch, the entrance at Burnt Ranch Canyon. Those are my mining claims.

I can clean up the Trinity River. I've got a company that we have portable equipment that's self-cleaning.

And I've got a background -- I'm originally from Phoenix, Arizona where I was an aerospace engineer for 20 years, worked on Star Wars technology, killer satellites, nuclear torpedoes, side-looking radar.

I left engineering Jan -- in July of '88 because I knew that on the Trinity -- I had gone to the Trinity River in May of '88, fell in love with it. And I wanted to get away from Phoenix, and I did.

But in the 11 years -- the 13 years since I've been on the Trinity -- I'm a graduate of the North American School of Conservation. I was going to be a game warden when I got out high school, except I became an engineer instead. So my big thing is conservation, water pollution and stuff like that.

I've been working and dredging on the Trinity River for -- since May of '88 -- March of '88. And when we had the floods in January -- in July -- or check that, January

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of '98 and January of '97, the whole personality of the Trinity River changed. We had, what we -- you know, an 80- or a hundred-year flood.

But when I'm down dredging in the Trinity -- I've got a couple of eight-inch dredges, but the salmon and the small fingerlings will come into the dredge hole where I'm working. And the fish are pulling on the hair of my hand. They're not afraid of me when I'm underwater working. And I'm just sucking material out there. But they're after that clean gravel.

And we had a bull salmon actual -- this actually happened about eight years ago -- ram one of my drivers in his face mask, chasing him out of the hole we dredged. That's how bad those salmon want those holes we dredged. I'm just telling you what we need -- what I see from my own perspective -- and I'm interested right now in the fishery aspect of the Trinity River, is get the silt out of it and half-inch-minus material or whatever, get that stuff classified, put on the bank and have trains or trucks haul it out. Get it out of the river.

About you built the dam in the 60's, there used to be holes in the Trinity River in excess of 60 feet deep. I know some people who used -- when they built the Highway 299, they used to sit and have lunch on the river banks and look down and see the fish in the clean gravels.

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Now, we can't do anything about the dam, the dam's there to protect the river. But what it has done -- and I'm not going to, you know, re-educate anybody -- is the river is so loaded with silt that needs to be taken out.

And I'm -- I've incorporated with a -- I've got equipment and I've got a company. I can get the mercury out of the river, I can get the lead out of the river, any heavy metals I can get out of the river.

What people are probably not aware of -- and I'm originally from Waukegan, Illinois. The mercury poisoning in Lake Michigan was so bad that the -- that they passed an ordinance and they were warning the public not to eat the Coho salmon that were introduced into Lake Michigan in the late 50's, because there was so -- the mercury poisoning was so bad that the fish were actually poisonous to eat.

Between Big Bar, California and Burnt Ranch or Del Loma, in the 40's a bucket line dredge sunk in the Trinity River. This is at least one that we know about. In that -- on that dredge -- it was as big as a floating four-unit apartment building, there was over 500 pounds of mercury that they admit to.

That mercury's in the middle of the river. When I pulled gold out of the river, it's coated with mercury.

When the hunters do their shooting and have lead

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shot in there, that's in the river. That's contaminating the river, it's hurting the fish population.

But the reason I came over here is that -- again, I was dredging Saturday and Sunday in the river. And the water is real cold. If you don't think, so come out with me tomorrow and I'll go back in the river. But I was wearing a wet suit.

But we have te -- I have the technology and I have got equipment that I'd have to contract out. In fact, I'm -- that's what I'm doing the next couple of months, is -- we have trommels, we have screens.

And what I -- what I think that the Trinity River could really use to help it out -- and again we're talking, you know -- we just have to take sections of the Trinity River at a time, put a lot of people to work, but we need to clean out that one-inch or half-inch-minus material and put it on the bank and have trucks haul it out.

One of the byproducts, we get rid of the mercury.

Two, get rid of the lead.

I don't want to get involved with toxic substances like acids or whatever they've got for fertilizers. I'm kind of afraid, because I'm actually working underwater with a wet suit.

But if we cleaned out areas and got the river so it

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would start cleaning itself out, it's -- it's -- it'd be expensive. But one of the byproducts is topsoil.

The farmers down there in the -- that are farming the land, their topsoil's gone. Ninety percent of their topsoil is on the watersheds, and it's back in the ocean.

And we -- we need to get that topsoil out of there, again haul it away with dump trucks. I'm talking, you know, huge operations. But that's a byproduct of cleaning up the river.

Give it back to the farmers. Either that or subsidize it, get it back there so they can go ahead and grow their crops.

Somebody thinks I'm out of line, talk to me now.

I've been dred -- I've -- I've -- I've looked at this area, I've looked -- I've seen the Trinity River, I've seen other rivers. And if you're going -- and I don't know the full scope of how far you guys want to go with this, but I have portable, self-cleaning plants, processing plants, that --

Now, mine are on a small scale, but we can go larger. I'm talking five tons an hour or bigger to clean that river up. And in the process of doing it, get all that mercury, all the -- all the contaminated metals out of there.

You will find that if you can clean sections of the

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river out, that your fish population will get real heavy in that area. Anytime I'm dredging the Trinity, in the summertime or whatever -- And incidentally, I didn't see any big salmon when I was over there. I dredged by Del Loma, just below the Del Loma RV Park. That's where I was this last weekend. In fact, my equipment is still on my trailer. I had -- I had to take a different vehicle in here to the meeting. But I know that if you can get the silt and the half-inch or one-inch-minus material out of the river -- maybe the first couple of years you can only get two percent, depending how many people you want to put to work. But that thing could be a profit -- it could be an on operation that could be run at a reduced cost. I can take -- a centrifuge is the best recovery system on the market that's sold to the public. And a good centrifuge with a 24-inch opening, by the time you get it set up with all its equipment and stuff like that, it weighs 5,000 to 10,000 pounds. I've got a unit that can get behind a centrifuge and clean up the tailings of a centrifuge and pull the mercury and the lead out of it that the centrifuge misses. And it weighs less than 200 pounds. And it floats. It's

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portable; I can take it anywhere. A couple weeks ago -- I've kind of been a little hectic. I had a helicopter take some of my equipment out of Burnt Ranch Canyon. And the fires over there, the Onion -- the Onion Mountain fire, I had to get out of there. The smoke was so bad, I thought I was going to burn to death, because the wind blowing through that Burnt Ranch, it's like a blow torch going through there. The smoke was so strong, I just couldn't -- you know, I had to get out of there. It was bad. But the salmon -- I was down diving in Burnt Ranch Canyon three weeks ago, and there's plenty of salmon that are 15 pounds and bigger in that area. They're right next to me when I'm working underwater. But in Del Loma where I was this past weekend, there are no big salmon. I didn't see any. Usually, I see a lot of them. I saw a salmon -- I saw a salmon and fish this big around me, but nothing bigger than that. And when I was down in Burnt Ranch Canyon eight days ago, there was salmon surfacing in -- just above Burnt Ranch Falls, which is where my camp was, there was salmon surfacing that weighed 15 to 18, 20 pounds. So they're down in the canyon, but they can't get out of the canyon because where the transfer station is at

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in Burnt Ranch, the river does a real sharp S-turn and it comes in. And it's all hardrock, bedrock here (indicating). Well, there's -- you've got a stretch of rocks that are the size of Volkswagens or television sets or whatever, and it's a stretch about 300 yards. And the fish can't get across those rocks. They could walk on them. And your fish are trapped down in the canyon. I showed -- I talked to Phil Warner about that ten years ago. And he went down there with a team. But with the big flooding we've had, it's dumped a bunch of rocks in that gorge at Burnt Ranch Canyon. And the salmon can't get past it. Right now they're trapped. If you guys go down and take a look, you'll find out that that's where the salmon are. But to clean -- to get back to cleaning the river up, I need to talk with somebody and find out who that I can work with that I can go in and take a stretch of the river and start cleaning it up. I'm going to dive in -- dredge in the river anyhow. I've been going it for 11 years, 12 years. But what happens is with the equipment that I've got, and we've spent months and years developing, it's portable. And I can go behind any processing plant, a trommel or anything, and I can work their stuff. And I can get the mer -- I can work their tailing piles and I

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can get all the mercury out of it and all of the lead. See, what these people are doing -- and I -- a percentage of the stuff that comes out of the river, if you put it in a dump truck, it's still contaminated. And you need to clean it is up. And when I'm -- when my system's done behind it, it cleans it all up. You've got fresh stuff. In fact, if you took the silt and the stuff that was in the -- in the river and put it in dump trucks and put it on a farmer's field, he'd have lead and mercury and God knows what else in his vegetable garden. And then he'd start wondering if it's safe to eat the vegetables. But the equipment I've got, again it's portable and also it's self-cleaning. People overlook this fact. I'm a dredger. I was an engineer before being a dredger. I'm still an engineer in my mind. A dredge works fine for the first five minutes, not even five. Ninety percent of the heavy metals that go through a dredger are back in the river. That's why the river's not clean. A dredge cannot hang on to mercury. Never. But if you -- if you -- if you -- if I can talk to somebody, I'll show them my equipment in the yard. But I'm getting ready -- When I heard -- somebody called my house at 1:05

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and said, "Hey, there's a meeting of the Fish & Game, trying to figure out how to restore the Trinity River." I said, "Well, I gotta get there." I hopped in a car and came over here. That's why I was late walking in the meeting.
But with the background that I've observed and search – I don't have all the answers, but I'll tell you what. I don't think there's anybody in this room can do what I can do.
And I was in whatever the water is, 50-degree water, 40-degree water. I was in that water yesterday. And I was in that water Saturday.
And the guys standing on the bank wouldn't even put their ankles in the water. That's how cold that Trinity River is right now.
And like I say, when you guys go down there and you check down by the transfer station at Burnt Ranch, walk over to where the white water is, you'll see your salmon trapped right there where I told you the big rocks are
There are -- Phil Warner,will – talk to Phil.
But I can clean that river up. I need grant money. I probably put 100, 500 people to work, particularly in Trinity County where the people need the jobs anyhow.
But I can get the contamination out and I can

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restore that river to a pristine situation that we had before.
People are wondering, you know, when they were doing the La Grange mining operation back around the turn of the century, in the 1900, 1930's, 1940's, they dump all kinds of garbage in the river. And yet the river came back.
I'm not saying it came back in -- and was pristine the way it was before they started working the river.
But in my own mind I think the reason you guys are having this meeting is in your own hearts you'd like to see the river the way it was maybe 200 years ago.
We cannot blow up the dam. The dam has to stay.
But what we can do is get that silt – and actually have a money-making, profitable -- I'm not -- maybe it won't be profitable the first couple of years, but you could use a byproduct of the silt, of the sand, of the pea gravel, of the half-inch gravel, you could --
Look at that guy who's got that black sand operation that paved Highway 299 this past summer. The guy's got all kinds of equipment. It wasn't there three years ago. But he knew he had a big contract coming, so he bought all those cement mixers and those big loaders, and he was ready for 299 to be repaved.
And what I'm saying, I've got the technology and

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I've got a man I'll bring here tomorrow – tonight to the meeting. His name's Lamar Meekham.
And what he did -- I met him in Salt Lake City April 2nd of this year. But what Lamar and his uncle used to do is go around to the old mining dumps. And they got tired of cleaning up their equipment, because their equipment -- if anybody has done any --
How many dredgers in here? Have we got any dredgers in here? I'm the only one dumb enough to go in the water.
But anyhow, Lamar would take his equipment and go to these old mine dumps and pick up the mercury, by the pound, pick up the copper, the lead and the gold.
And he -- I met him on April 2nd. And he -- of this year. He says, "I've got the best recovery system in the world." He says, "I can process anything."
And he – what Lamar has is people who want to have him process 100 tons a day. He can do it. He's got the knowledge and the experience.
Lamar is 65 years old, but he's one of these old timers that knows how to work the old mine tailings and stuff like that successfully.
Well, what I did, I said, "Lamar," I says, "geez, your stuff is great."
He came over to see me the first of June of this

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year. And we were on one of my mining claims in Del Loma, on the Trinity River.
Well, he pulls up in this real nice green trailer, mounted on – you know, on tires and stuff. The unit probably weighed 3,000, 4,000 pounds. I said, "Lamar, I need to float it."
"Well, Roger, how come you want to float it?"
I says, "Because I want the thing to go around with my dredge so when I pick up the material, you can process behind me," because he'd already told he could get all the mercury.
I was going -- I going to talk to somebody this year anyhow. That's my game plan, because I can get the mercury and the lead out. I already know I can do it.
But I know also that I don't -- unless somebody wants to call me on the carpet now – I don't think there's anybody in this room that knows what I know. And I can get that contamination out of the Trinity.
But the other thing I say -- and I'm not using big words, I'm not going to use any big words, I used to ten, 12 years ago, but I don't do that anymore.
I can get -- I can get the contaminants out. But with that I want – I don't know what you guys would do.
If we got, say, half-inch-minus material and put it on the bank -- and you're talking, you know, a hundred yard

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stretch of the Trinity River or 660 feet, you know, an eighth of a mile, you're talking -- to clean the Trinity River up, you're talking trying to move out, you know -- I'm -- on a one forty acre claim of mine there's enough overburden dumped in the January 1997 flood that you could have filled a football stadium, including the bleachers, with just one flood. And that's on the Trinity River.

And what's been the part that I wanted to get ahold of with Forest Service, Fish & Game or the Department of Interior is hey, I can put the stuff on the bank. I'll classify it for you.

There won't be anything toxic in it. There won't be any mercury. So it's clean. There wouldn't be any lead. We'll have that lead contained. We'll show it to you. We will show it to you. It will not go back in the water.

But where are you going to get the dump trucks or the train cars or whatever, conveyors, to take that stuff and get it away from the river? And I'm talking about a hundred miles away from the river. Get it back to Redding. Get it back -- give it to the farmers, because they're losing the topsoil that went in there.

And if you look at the long-term scope of everything, I'm talking about the next 20, 40, 50 years, if you could get the silt, which is topsoil, it's got

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nutrients in it -- I'm talking about while it's still in the river, not the ocean -- once it goes to the ocean, it's not fit for farming anymore.

Do you say what I'm saying? Does it make any sense to you.

But if you can get that silt and topsoil and get it back on top, have the government subsidize it, give it back to the farmers. It's come off of their land anyhow.

And I don't know if you guys are thinking that far beyond it. That's what I've been thinking about for years.

But I've got equipment that can put it all on the bank. I can classify it. And like I said, I can clean it.

And if you want to clean and restore that river, you've got to try to go back 200 years, not 50 years, 200 years. You've got to go back before they started hydraulicking and using the mercury and the toxic.

When -- when -- like I say, just -- I know of just one instance where the -- where the bucket line dredge sunk below Big Bar. And there was 500 pounds that they would admit to of mercury on that dredge alone.

And when you get around the Big Bar area, Big Bar/Del Loma, you pick gold out of the river, it's coated with mercury.

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Down in the bottom of that river, there's pools of mercury probably 50 feet wide, 20 feet long. It might have -- one pool might have a hundred pounds or 200 pounds of mercury. It's still in there.

People say, "Well, the mercury not bothering anything. It's at the bottom."

Do you want to bet?

Because that merc -- that sand and gravel out -- that mercury is getting coated on everything. And it's getting all pulverized. And the rocks are pounding down on it and splashing on it, just like water. And it's going back into your system. And it's not good for the fish.

Okay. I've said too much.

But I can answer anybody's questions. If they think that I don't know what I'm talking about, I'll have somebody ask me now.

But I can clean that river. And I'm going to need a lot of help to do it.

And you might start with a target area of river of a quarter mile or something. But the -- if you want to clean that river up, think 200 years. Don't think 50 years, think 200 years, before the dam was built and before they ever did the hydraulic mining operations on the Trinity River.

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On the Trinity River in 1946 was when the first dredge was put on the river. And they used mercury. I'm talking about floating dredge.

And all of my equipment is portable. That's another big factor. You know, if they want to lower it by helicopter, that's their business.

But it's portable, I can float it. I can take it to anywhere in the river, you know, given enough whatever.

Do you know what I'm saying?

But you're talking about a big project. And if somebody says, "Well, how do you eat an elephant?" You take it one bite at a time. That's the only way you can eat an elephant, is one bite a time.

If you want to clean up that river, you have to start with a little stretch of it. And you'll find out that in that target area -- And I've got -- and I can stand here and tell you the salmon chased me out of their dredge holes. I did something they want. I clean -- I expose clean gravel.

And in July when I'm down there dredging, I can be working the middle of the river and I'm in shade. I'm in shade totally. That's how many fish are around me.

Now, they might only be this long (indicating), but there's hundreds of them. Like I say, they're all over my gloves, my hands.

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And when my – when I'm down there at the bottom, I'll have a dredge nozzle down here working, the fish are all around me picking, picking, picking, picking, because the river's coated with silt and algae.
And I – I – I don't – I – I mean, I could talk to you guys till midnight, and you don't want to hear what I'm saying. But I know what I'm saying is true. I know what I'm saying is true.
And I know I can clean up the Trinity River. And I need a lot of help to do it. We can put a lot of people to work. But again, think of the river 200 years from now, not – 200 years ago, not 50 years ago.
PRESIDING OFFICER RUESINK: Mr. Sherwood, thank you for your comments.
There are representatives from Fish and Wildlife Service and some of the other agencies here, and you may wish to talk to them.
MR. FEIDER: I would like talk with them.
PRESIDING OFFICER RUESINK: Thank you again for your comments.
MR. FEIDER: See, I've been on the river. I've got about 70 miles of mining claims.
PRESIDING OFFICER RUESINK: I have no other slips for people wishing to make a statement. We have more time, but unless there's someone else that wishes to

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speak right now, I'll recess the hearing. We'll go off the record.
If you have decided that you would like to make a statement, please go to the registration table, fill out a yellow card, and we'll go back on the record and take your statement in a little while.
So we're officially off the record right now.
(Recess taken, 2:02 p.m. - 2:51 p.m.)
PRESIDING OFFICER RUESINK: I'll reconvene the hearing now. We're back on the record.
I neglected to mention earlier that the hearing this afternoon is scheduled from 1:00 till 3:00 p.m. And then we'll be back here this evening from 6:00 to 8:00 p.m.
So that administrative record will be the total of the presentations that we get this afternoon and then again this evening.
We do have one more speaker: Debra Speer.
And you weren't here earlier, and so I'll give you just a very brief description of the way we're conducting the hearing.
If you'll step to the microphone, please, and spell your last name for the court reporter.
We are taking a verbatim transcript of all of the presentations. If you have a copy of a written statement

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that you could leave with us, that would be fine. If not, that's okay, too.
And it's an informal hearing, not subject to any question-and-answer or cross-examination, anything like that.
So if you'd step up to the microphone, please, and give us your comments.
MS. SPEER: I've never done this before. It –
PRESIDING OFFICER RUESINK: Would you speak louder and more toward the mike, please.
MS. SPEER: Having never done this before, I'm kind of nervous, but I'll get over that. I'm here out of concern for the –
PRESIDING OFFICER RUESINK: Would your state your name and spell it for the record?
MS. SPEER: Debra Speer, D-e-b-r-a, Speer, S-p-e-e-r.
PRESIDING OFFICER RUESINK: Thank you.
MS. SPEER: And specifically my understanding of what is going into your consideration of the EIR impacts to the Trinity River is that you're debating the amount of water flow that you're going to restore to the river.
And based on some information that I have, my

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understanding is that the Trinity River Act of 1955 was supposed to mean the water flow to the Trinity River did not impact the fish in that river.
And my understanding is that 90 percent of the flow has been diverted since that time, since the dam has gone into place.
And because of that, it has had a serious impact on the fish in the river, to the point that they're now an endangered species, the Coho.
My understanding is most of the flow is diverted to the San Joaquin water flow for agriculture. And not that I'm against agriculture, but knowing that they are a gigantic lobby interest in this state, I would just like you to consider other alternatives for the water use.
And I'm not sure even if it's the correct time to address that, but I believe the most – the vast part of our agriculture and water use goes to feeding cows and things like that – and that most of the water use goes into grain, I should say, that feeds cows.
And so even though that is probably something rather circuitous, the impacts, I'm still saying I don't want the Trinity River water going to that use.
That's my one vote. Envious.
I also understand that you have some obligations to the Native American tribes that for the past 36 years also

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have supposedly -- you're not supposed to have as much diversion of the water based under that law as well. So I guess what I'm trying to say is that this is not -- shouldn't even really be an issue for Cal-Fed as such, because of the past legislation that is already -- but this is -- that this is already covered by, which is the Trinity River Act and the trust obligations to Native American tribes.

I think there was another point.

So I think at the last -- for a summary, I would just like to encourage you, both for recreational users and for the fisheries, to consider up to re -- restoring up to -- beyond the 48 percent I think you're considering, up to at least what I believe studies have indicated the minimum is 70 percent restoration of flow to restore our fish and the natural habitat to the Trinity.

It's beautiful. If you haven't been there, go. It's wonderful. Kayaking, rafting, fishing, it's beautiful.

Thank you.

PRESIDING OFFICER RUESINK: Thank you for your comments.

I have about three minutes until the scheduled close of this hearing. Again, if anyone wishes to make a statement, please fill out one of the yellow cards at the

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desk. And this is your last chance for the afternoon session.

MR. SHERWOOD: Could I make one more comment?

PRESIDING OFFICER RUESINK: Come up to the microphone, Mr. Sherwood. I may limit you on time here.

MS. SPEER: One minute.

PRESIDING OFFICER RUESINK: And this --

MR. SHERWOOD: Okay.

PRESIDING OFFICER RUESINK: I get -- I should tell you also: Again, please address your comments to the folks at the table here.

MR. SHERWOOD: Okay.

PRESIDING OFFICER RUESINK: Because we're not having question-and-answer between speakers and the audience.

MR. SHERWOOD: Okay. Roger Sherwood. I live in Anderson.

The Trinity River 50, 60 years ago, I've talked to old timers on the Trinity, had holes in it or pits in it 80 and 90 feet deep. Now that area is all covered with sediment and silt.

If some way, somehow you could get or reduce the amount even by ten percent, if you could get that sediment out, say three-eighths-minus material, and get it out of

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the river, you could operate on one-fourth or less of the water flow and it would still have their recreation as enjoyment, rafting and fishing, because that water all has to travel through 20, 30, 40, 50, 60 feet of silt.

There's still water in that silt. So what happens, it's like a V. When that river -- when the river channel opens up and it's loaded with 40 feet of silt, it takes more water to have five feet of water through 40 feet of overburden than it would if you cleaned the river up and got that silt and three-eighths-minus material on the bank and hauled it away.

So you could still have the recreation with one-fourth less water, and they could enjoy it the way it should have been enjoyed. That's all I'm trying to say. This silt is the problem.

PRESIDING OFFICER RUESINK: Thank you for that additional comment, Mr. Sherwood.

According to my watch, it's 3:00 p.m.

Again, if there are no further slips and people wishing to make a statement, I will close the hearing. We will reconvene this evening at 6:00 p.m. and be here from 6:00 until 8:00 p.m.

The hearing is closed and we're off the record.

(Recess taken, 3:00 p.m.)

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EVENING SESSION - 6:00 P.M.

PRESIDING OFFICER RUESINK: We're on the record.

Good evening. On behalf of the United States Fish and Wildlife Service, I welcome you to this public hearing.

The US Fish and Wildlife Service, US Bureau of Reclamation, Hoopa Valley Tribe and Trinity County are conducting a joint process for taking comments on the draft Environmental Impact Statement/Environmental Impact Record for the Trinity River mainstem fishery restoration.

My name is Robert Ruesink. The last name is spelled R-u-e-s, as in Sierra, i-n-k. I'm the supervisor of the Fish and Wildlife Services, Snake River Basin Office in Boise, Idaho. Tonight I will be serving as the presiding official for this hearing.

The scheduled time for the hearing is from 6:00 p.m. until 8:00 p.m. And at 8:00 p.m, we will adjourn or close the hearing and go off the record.

At the table to my left are representatives from the US Fish & Wildlife Service, Bureau of Reclamation, Hoopa Valley Tribe and Trinity County. In a minute they will introduce themselves and have some opening comments.

Other representatives of the US Fish and Wildlife Service are also here this evening at the registration

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table. And we have information at that table where you came into the building. I would encourage you to ask questions and to look at some of that material related to the issues that we'll be speaking to.

At this point I'd like to introduce Mary Ellen Mueller. She is the Fishery Supervisor for the California/Nevada Operations Office.

DR. MUELLER: Good evening. Thank you for coming.

The release of the draft Trinity River mainstem fishery restoration Environmental Impact Statement/Environmental Impact Report is the latest step in a process that Congress initiated several years ago to address long-standing concerns about the effects of water diversion, in-stream habitat, sedimentation, watershed management issues on the Trinity River system's health, including its once abundant salmon runs.

Congress directed the Secretary of the Interior to evaluate the impacts of these issues and to take steps to restore the health of the Trinity River system.

In response to this congressional mandate, the Department of the Interior has been actively participating in a study for more than 15 years.

This has been a collaborative effort led by the US

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Fish and Wildlife, the US Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County.

The EIS/EIR summarizes the research that has been undertaken over the past several years and identifies for public comment several potential alternatives for restoring the Trinity River system.

Impacts considered under NEPA And CEQA are not limited to impacts to the fishery resources of the Trinity River, but include all impacts of the action affecting the human environment.

The department encourages public comment on all aspects of the draft EIS/EIR. This public hearing is part of the comment process of the draft EIS/EIR.

The public comment period will be closed December 20th, 1999. A Record of Decision is expected in the early spring of the year 2000.

On behalf of the Fish and Wildlife Service, the Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County, I thank you for the effort you have made to attend this meeting and also thank you in advance for your comments.

Now I'll pass it on to Chris Erickson, representative of Trinity County.

MR. ERICKSON: I'm Chris Erickson, Supervisor in Trinity County. And Trinity County is the lead agency

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under the CEQA process. And so that's why we're involved in this hearing tonight.

MR. ORCUTT: Good evening. My name's Mike Orcutt. I'm here representing the Hoopa Valley Tribe. And I just have a couple of brief opening comments.

The main reason the tribe has been involved is the -- our tribe has 2200 members. We have lands on the lower Trinity River, about 90,000 acres of land. And we have documented existence of over -- at least 7500 years in that area of the Trinity River Basin.

And historically and contemporarily, the tribe's existence really depended upon the status and the health of that resource.

And as you'll hear later in the information, the status of that resource is one in which Coho salmon are listed, steelhead probably will be listed, and Chinook salmon just underwent a status review by the National Fishery Service. And their recommendation was not to list those stocks.

And again, there's -- as Mary Ellen had stated, Congress has intervened in response to those declines in fish populations with the Trinity River Restoration Program, CVPIA and that specific provision in terms of stream flows.

One additional obligation that the federal

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government has is the federal trust responsibility to both Hoopa Valley and Yurok Tribes who possess federally reserved fishing rights in the basin.

So we've been involved from the beginning. I think it's a unique relationship where an Indian tribe has participated with federal agencies in meeting the NEPA requirements.

So I guess I'd thank you in advance for your comments and look forward to hearing everyone tonight. Thank you.

MR. RYAN: Thanks, Mike.

My name is Mike Ryan. I work with the US Bureau of Reclamation. My title is Northern California Area Manager.

And a portion of my job includes the operation and maintenance of some of the features within the Central Valley Project over on the Trinity River division.

And I thank you for being here tonight also.

PRESIDING OFFICER RUESINK: Thank you all for those comments.

Again, public comments on the draft EIS/EIR will be accepted until December 20th, 1999. After review and consideration of your comments, the four agencies who are co-leaders in this effort, along with other cooperating agencies, will compile information necessary to prepare a

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final Environmental Impact Statement/Environmental Impact Report. The purpose of this hearing is to receive your comments on the draft EIS/EIR. Comments on all aspects of the alternatives described in those documents are very important and will be carefully considered. Because of the importance of your comments, it is necessary that we follow certain procedures here this evening. If you want to present comments at this hearing, please register at the table where you came into the building. And the way you register and indicate that you wish to present comments is by filling out one of these yellow comment cards (indicating). When you register, indicate if you're representing an organization. And when you are called to present your comments, please come forward to the microphone in the front, begin your presentation by stating your full name, spell it for the record, and indicate if you are representing some agency or organization. This is an informal hearing, and therefore you will not be cross-examined or questioned in connection with your comments. Your comments or questions are being recorded by the reporter to preserve them for the record. Please keep

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in mind that the reporter will not record any statements from the audience or which are made to the audience. Comments must be made into the microphone in order to ensure that they will become a part of the record. Please leave a copy of any written material to which you refer with the reporter or the registration staff. If you are reading your testimony, please read slowly enough for the reporter to be able to record your comments. We do want to get all of your comments down in a verbatim transcript. You do have the option to submit comments in writing if you do not wish to present a statement here at this hearing this evening. Written comments may be submitted to the staff at the registration table or they may be mailed to Mr. Joe Polos, P-o-l-o-s, US Fish and Wildlife Service, 1655 Heindon Road -- that's H-e-i-n-d-o-n Road -- in Arcata, California, 95521. That address I believe is also posted at the registration table. Written comments again will be accepted through December 20th, 1999. Written comments are given the same weight or consideration as oral comments that are presented here. At this point we are ready for the first speaker.

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Rick Coleman, would you come forward to the microphone, please?

MR. COLEMAN: Good evening. My name is Rick Coleman, C-o-l-e-m-a-n. I'm the general manager for the Trinity Public Utilities District. We're a nonprofit electric utility in Trinity County. We're governed by a five-member, elected board that's separate and apart from Trinity County. So we're a different entity in Trinity County. So people get us confused.

The first thing I want to talk about is the PUD in itself. We actually have our genus in the 1955 act that created the dam. When that 1955 act was enacted, many of the people in Trinity County realized that flooding 25,000 acres of private property, plus 50 some odd thousand acres of timber land, was going to have a devastating effect on the county. And they wanted that mitigated.

What they asked for was to allow PG&E to build hydro facilities because they were expecting to get the tax revenue from the PG&E hydro facilities. Congress, in their infinite wisdom, decided to allow Trinity County to get 25 percent of the energy from that project, in lieu of the tax benefit, to mitigate the flooding to that county.

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Consequently -- and I don't want to belabor the history, we weren't really formed in '82 -- a lot of those promises were foregone, the county lost over a million dollars to its economy. And this doesn't have anything to do with the fish issue, just taking of land. But today we are serving about 95 percent of the county. And they do enjoy low rates. We're very unique as a Western customer. We're the only Western customer who has a first preference right to the power. We're the only Western customer -- we're not the only Western customer who has the first rights, but one of only one other has a first right to the power. In other words, we're not subject to an allocation process. But we're the only customer whose rights to power is five times higher than what we currently use, meaning that if there's less Western generation or less generation from the TRD dam, we don't have to go out and replace it. It just means someone else is going to have to forego even more generation from this project in order to meet our congressional rights.

With that as a foresight of what we do here, I'd like to start off with saying that I think it's kind of insulting to be here tonight. I've had 14 working days since I reviewed -- or received the document, and I have yet to receive all of the appendices. But yet today we're

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holding public hearings.

Obviously, I know you've been hearing it before, and I'm going to repeat it, I think an extension of time to this comment period is drastically needed so that you can get all thoughts out.

I also think that you should hold workshops.

You should already have received a list of 33 questions that we've -- that the PUD's generated that points to the ambiguity, the conflicts, the internal inconsistencies to the documents, and basically asking for some of the reasons behind the documents, because we need those answers in order to formulate what I would call constructive comments.

We may be making a comment on something you've considered, but it isn't disclosed in the document.

So with that said, we are going to prepare written comments. I hope you'll give us more time to present written comments.

I would like to touch on some of the key points tonight just so it may help you to think about the need to extend the comment period and to hold workshops.

First of all, I'd like to discuss the only time -- or the thing called environmental justice.

As I understand it, the executive order for environmental justice basically says minorities and

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low-income people, disenfranchised people, can't respond to three feet of documents and five years of writing a document and millions and millions of dollars going into the document.

Their interests are buried or hidden in this avalanche of material and studies, and that the agencies must consider the -- these people's distinct needs.

In fact, the executive order says that you must consider what this will do to minority populations and low-income populations.

But the EIS conveniently drops the first population and says we have to look at minority and low-income populations. Then concludes the only minorities with low incomes that are affected are the Indians and the migrant farm workers, and it does some discussion about that.

I submit if you look at the economy of Trinity County and you look at the executive order, it was clearly intended to look at the low population, meaning Trinity County, and what would that mean to Trinity County.

We have one of the lowest economies in the state.

And, in fact, if you read the few sections or parts of the EIS I've read about the Indians where it talks about a malaise, about a stagnant economy, about the children having to leave to find good jobs, et cetera, it sounds like, if you take away the common religion aspect

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of it, it sound like Trinity County. It sounds like Weaverville. It sounds like Hayfork. It doesn't sound any different than what we're experiencing.

The only place in the EIS that I can tell that there's any disclosure of what this will do to Trinity County is when it comes to the power costs.

Everywhere else Trinity County is lumped with Humboldt or Trinity County is lumped with Shasta or Trinity County is lumped with some other region.

So you don't know what it's going to do. Both benefits and impacts are not listed for Trinity County, except for power.

And that number says well, this is going to cost in the year 2020, in 1997 dollars, $69,000 a year. That's laughable. It doesn't even pass the smells test.

Today, I received a letter from both R.W. Beck and Western -- and the reason I got it today points to again how ludicrously short this comment period is -- that says the 69,000 wasn't intended to tell you what it's going to cost Trinity County; it was intended to be used in some kind of model for comparative purposes. Our work scope was very narrow and we didn't look at first preference costs.

This gets back to where I said we're the only first preference customer that Western serves that has an

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allocation much larger than our load.

The true number for Trinity PUD is something in the neighborhood of four or $500,000, not $69,000.

And I was told that this $69,000 number was used for some kind of regional comparison to go into some socio-economic analysis, socio-economic model.

From what I can read in the report, the socio-economic model doesn't disclose that it's using power costs. I can only assume it's using the $69,000 number.

And by the way, I also think in Redding the number's very much understated for other reasons.

Then concludes in the year 2020, the flow decision is going to create 66 new jobs in Shasta and Trinity County, with the low number.

I was discussing this issue with the owner of the local lumber mill, which is the last remaining large mill in Trinity County due to the spotted owl fiasco. And asked him, you know, what would a ten percent rate increase mean to him.

"It's equivalent to two full-time jobs."

I said, "Well, this economic model says it's going the create 66 new jobs."

And he said, "Well, yeah, that's probably a hundred more jobs in Shasta County and 34 less jobs in Trinity

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County." The fact of the matter is is we don't know. Getting back to environmental justice, we should know what this is going to mean to Trinity County. In my opinion, the document doesn't – and maybe you touched on this when you provided your opening comments, maybe we're not looking at just trying to help fish. Maybe we're trying to rearrange rocks and gravel, but I thought the thrust of this whole program was to help fish.
And much of the document seems to rationalize more water, not to justify how to do more fish.
And sometimes I begin to wonder if some of the proponents of this doesn't care if more fish happen, as long as they get something to – back to predevelopment days before people moved into California and started needing this water.
Which brings me to another point, is I – that I don't understand in reading the document. It seems like without quoting specific numbers of what we're trying to get with fish, we're going to try to get something pre-Trinity Dam Act numbers. It sounds like maybe, or maybe it's pre-1500 numbers. I don't know.
But all of this is going to be paid for by the people who benefit from the dam ultimately.
One of the things that isn't mentioned in the EIS

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is the 115 million dollars in implement costs. It never says who's doing to pay for that.
Well, traditionally, water and power pays for it.
And that essentially doubles the impact to power customers that you have disclosed as the cost to the other power customers. It doesn't even affect the PUD.
But there's other rivers that don't have dams. And their fisheries are declined by 20, to 25, 30, 40 percent of what they used to be.
I think the best example is the Smith River which has virtually no dams on it, no diversion, doesn't have something like the Klamath coming into it that dilutes most of the Trinity River water, and its fisheries is way, way, way down.
Why should the dam and the beneficiaries from the dam be required to pay to improve the fishery beyond the point that other fisheries that don't have dams are? That seems to me that should be the limit of the exposure.
The other thing I want to talk about is cumulative impacts. And I'm not meaning the issue that we have all these things going on in the Central Valley, the Cal-Fed and the CVPIA and a bunch of other programs intended to deprive people of water.
What I'm talking about is the cumulative impacts from now, or from the flow decision, to the year 2020.

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Everything in this study is looking at the year 2020. The only reason I can figure out for doing that is because it takes that many years for enough generation of fish to create enough fish to be able to justify all this cost.
But in the meantime, as near as I can tell, Trinity PUD will have paid, if our growth is the same as it was since 1993, which is modest by California standards, will have paid over 11 million dollars cumulatively in the hopes that this might bring more fish.
It's a lot less than the 69,000 per year number that comes up in the study.
Of course, all of this study – all this report is models talking to models. We've got numbers coming out of this report that are good to the fifth decimal point.
The truth of the matter is is none of this is probably accurate plus or minus 30 or 40 or 50 percent.
We're literally projecting what we think might happen in the year 2020. We have a hard time figuring out what happened last year.
So how do we know any of this modeling is going to make sense?
What we do know is if this flow study is implemented, it's going to cost people real money right now, today, the very first day this is implemented. We

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don't know how much, but we know it's going to cost.
We think maybe it will create more fish three years, five years, 20 years down the road. We don't know.
To me, that's the more common sense approach. Why not go by this slowly instead of just making one massive step?
In closure, I think it's very important to go back to what this means to the people of Trinity County. This means that over the next 20 years a family – every man, woman and child in Trinity County will have paid over a thousand dollars if this flow decision is implemented.
That means a family of four in Hayfork that's not much affected by this river, that has a median income of around $22,000, is going to be paying one-fourth of their annual budget on nothing more than a gamble that this is going to improve the fisheries, with no provisions in there to go back to where it was if it doesn't improve the fisheries.
In fact, what I suspect is going to happen is we're going to ask the family to pay more if there's no more fisheries.
I would like to ask why is it that decades ago we figured out that we cannot commercially harvest game? We don't let commercial interests hunt ducks, geese, other game birds, buffalo, deer. We realized decades ago that

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man and his technology is so efficient we can wipe out the game. Why didn't we figure out that we can also wipe out the fishery? Why has it taken us decades later to realize that we cannot commercially harvest the fishery. If what we're really wanting to do is get more fish in the river, rather than spend the 200, 300, 400 million dollars that we're talking about over the next 20 years – and it's not disclosed in the report in total, so who knows what it is, it's several hundred millions -- wouldn't it make more sense to tell the commercial fishermen to be fish farmers, to let the existing fish come up the river. Now, some people will claim well, there's only so much habitat for the existing fish. Well, fine. Whatever there's not enough habitat for, let them catch that with a rod and reel. One of my favorite expressions about this is it's not an issue of whether the fish live or die, it's who has a right to kill them. I think it's way past the time of realizing that fish are no different than the deer, the buffalo, the ducks. They cannot be continued to be commercially harvested. In closing, I would like to say that we need more

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time to digest this. This is very important. I think you should have more workshops on this to explain your rationale and your reasoning for it. And I think there should be sufficient – I've heard rumors that there's going to be a workshop, but then we're still only going to have four days after the workshop to comment. I think if you go the extra step to have a workshop, you should provide enough time after the workshop to get our thoughts to get and provide comments. Thank you.

PRESIDING OFFICER RUESINK: Thank you for your comments, Mr. Coleman. Our next speaker is State Senator Maurice Johannessen.

SENATOR JOHANNESSEN: Thank you and welcome to God's country. I drove up the valley and I can tell you that aside from the rain following me up the valley, I'm glad to be back in Redding.

PRESIDING OFFICER RUESINK: Senator, could I ask you to state your name and spell it for the record?

SENATOR JOHANNESSEN: Sure. Senator Maurice Johannessen, J-o-h-a-n-n-e-s-s-e-n, Senator for the Fourth District which includes 11 counties, 38 cities, almost 900,000 people and most of northern California.

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PRESIDING OFFICER RUESINK: Thank you.

MR. COLEMAN: Including Trinity.

One of the things that concerns me, and it's something perhaps that we need some closure on. To be honest with you, until I saw it in the newspaper this morning and I alerted my staff in Redding that they would take the time to go over and listen to what was happening, I had no idea that this hearing was being put in place. In realizing the complexity of this kind of a situation, I think it is beholden to anyone like yourself who is going to have these hearings, to make sure that we have the time to study it and the time to analyze what is being proposed. I'll give you just a – perhaps my interest in it. And this is not a political issue, because I'm the Chairman of the Cal-Fed – legislative Cal-Fed committee that oversees the water issues for the State of California. So I have more than just a cursory interest in what's happened. It is not the north/south kind of a thing or whatever. That has nothing do with it. But I just tell you that because of the importance that we have a chance to look into and see what exactly has to be proposed. Just glancing at this as I walked through the

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door – it was left on my doorstep – as I drove, and it looks like it is a lot of voodoo science involved in this as far as the fisheries and what happened. The 2020, the 60 percent to 65 percent seem to be a rather interesting figure. I don't know quite frankly how they -- they come up with that. I've lived there 40 years, so I'm well aware of this countryside here. The – I suspect that there is a project that is being decided on, and we now merrily go through the effort of trying to legitimize what the process should be in order to achieve what we have already decided it should be. Is this too far off? Maybe not. I had a chance to talk to Babbitt, Interior Secretary Babbitt, who, as you know all know, was the governor of Arizona, and – back I think about three or four or five months ago. And the idea then was that, number one, Trinity was not in the Cal-Fed mix at all. The Cal-Fed being a consortium of about 14 or 15 federal and state agencies, all who have their own agendas, none that cooperate with each other. Now, if that isn't a kettle of fish, I don't know. And we have found myself in a position where we may have to end up, in order to get to the bottom of a lot of

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this, to use either committee hearings, which we will be doing more of, we have done some, but also that we will get back into the area -- maybe forced to using subpoenas to get the information that we're trying to get.

With that as the background, at that particular time Interior Secretary Babbitt said well, I think that Trinity, really we don't have to worry too much about it in Cal-Fed process. And in any event, we are talking maybe 250,000 acre feet of water that would have to be transferred through the Trinity system to the Klamath River Basin, of Klamath River, in order to solve the problems that it -- that was supposedly involved with the Indians.

Since then I understand that we are talking about a possibility of transfer somewhere in the area of 340 to 800,000 acre feet of water through the Trinity system.

I also point out to you that there is about a million acre feet of water that now goes through this system to the Carr powerhouse at Whiskeytown and a few other things.

And we're already about a million acre feet short of the deliveries to the Central Valley projects, to the contract holders of the two projects.

So if you take that out of the mix again, we're already a million acres feet short -- a million acre feet

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short, we now take the additional -- maybe let's say three-quarter of a million acre feet, we are talking about putting more water through the, quote, "preferred alternative," through the Delta, pushing water through the Delta, northern California water, into the bay and then obviously down to the pumps down in Tracy.

So the question now is where is the water going to come from to do this little voodoo science that I called it? Where is it going to come from?

There is no doubt in my mind that transfer of water will take place. We in northern California are blessed with about 80 percent of the water and 20 percent of people.

And as a good friend of mine in the old days, Senator Seymore, used to say, "Well, think about it. Either you give us the water or we give you the people."

I have a problem with that. I can't quite figure out what the answer should be on that one.

But the point is we know what's going to happen. So the question is if we can get above the trees and look behind and say well, we're going to need anywhere from six to nine million acre feet more in the next 25 to 35 years.

Where do we get it and how do we do it?

Obviously, we -- additional storage have to be in

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that mix. It can't be done otherwise. It can't be done.

And if we are continuing on the process that we're doing now by taking the water away from this side, if you will, from the eastern side, and put it through Trinity --

And by the way, the Trinity should be cured. They have a lot of problems and they need to be solved.

But the problem can be solved only with additional water, not only for their part, but for all our parts.

The question that has to be answered when you deal with this, it has to be -- Trinity River has to be in the mix of what we're trying to do in the state of California.

My job is not just thinking about northern California, but obviously I have a bias. And I admit to that. But it has to do with how do we solve the problem in the total -- in totality in California?

We got pretty well on the road to doing that in southern California. We have worked and given them the lining, the American canal, and the transfer of water from Imperial Valley and San Diego. I think we have that just about worked out.

Northern California has the water. Quite frankly, we don't have the problem. We're just trying to keep some of what we have.

The problem lies in the central California. And there's where some of the biggest problems that we're

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going to really deal with.

So when you're thinking in terms of Trinity River and the Trinity watershed, you have to think in terms of what the effect is going to be and the third party impacts in northern California itself. You have to do it.

At this particular point they are talking about laying fallow anywhere up to a million acres of good farmland in order, quote, "to save the water for all the restoration projects."

We have spent a couple of billion dollars -- or going to spend a couple of billion dollars merely to do restoration work, to do wetlands, meanderers, take-a-way levees, all of these things. But not one dime at this point has been spent for the study and the action needed to build reservoirs to take the -- to control the water.

In fact, already the good peripheral canal which -- we call it the "P word" -- is already being followed. And some of the land is already been bought down in Hood and so forth to do the canal.

So anyone that thinks that the decision hasn't already been made to do what's going to be done in the future, think again, because it's going to be.

Our fight is let's provide as much water as we can through the Trinity system. But bear in mind that whatever is taken away, we've got to replace it from

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somewhere. And the only way we can do that is through reservoirs that is necessary to be built. And that is about a seven- to ten-year lag time. So I'm asking you in doing this, I'm glad this is finally coming to a head, but I would appreciate in the future if at least through my capitol office and through my committee, that we get a copy of these things prior to any kind of a hearing. Thank you. Glad to be here. Appreciate your all being here.

PRESIDING OFFICER RUESINK: Thank you.

SENATOR JOHANNESSEN: Maybe you don't sometime, but it's interesting.

PRESIDING OFFICER RUESINK: Thank you, Senator Johannessen. Our next speaker is Tina Andolina.

MS. ANDOLINA: Thank you very much. I'm Tina Andolina with Friends of the Trinity River. That's A-n-d-o-l-i-n-a. The first thing I want to address is I want to thank you very much for coming up here and for completing the flow study and the EIS and the EIR. I've been following this for some time, as have most of people that have commented or are in this room. And I think, you know, the six-day public comment period

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is great, that's given us ample time to review everything. You guys have met your NEPA and CEQA requirements. This process has been delayed and delayed and delayed and delayed. And I would appreciate no further delays. The fish have waited 36 years while their habitat has been destroyed. It's time to move forward, move forward a Record of Decision, not have this process drawn out and drawn out. Secondly, I'd like to say that the legislation surrounding the Trinity River and the Trinity River Authorization Act clearly give it a unique position among all water projects in California. The law clearly says the fisheries should not be harmed. And in the CVPIA -- clearly says the Trinity River is unique. Its position is unique in California and it is not to be tangled into the mix of other California issues. And that includes Cal-Fed. Trinity River is separate from Cal-Fed, it should remain separate from Cal-Fed. And if it is allowed to be combined, not only will this process be delayed, but Cal-Fed will be delayed. And that's not good for the environment, it's not good for the farmers, it's not good for California or California's future. Now, to get back to the point I really wanted to

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make coming up here, we support the science and the scientific study and investigation that have gone into producing the flow study and the Environmental Impact Statement. We think the science is very sound. However, we still feel that more water is needed to truly restore the fisheries. We think that the preferred alternative, giving the river roughly 48 percent of the water, combined with mechanical restoration, is far too reliant on the mechanical restoration to truly get done what needs to be done, what giving the river more water could get done. We would like to see flows at about 70 percent because, first, you know, other scientific studies have indicated that rivers left to themselves need at less 70 percent of their flow to maintain a healthy fishery. Second, as we've seen this year and in years past, funding for restoring the Trinity River isn't very reliable. So if we focus too much on the mechanical restoration and that part, needing to get congressional funding every year, restoring the Trinity River might not actually occur on a timely schedule. Second, I want to address the -- you know, some people were up here saying that, you know, if we're going to give water back to the Trinity River, we need to do some mitigation. And some people have suggested surface

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storage. Well, I say no surface storage. There are -- most of the water that is taken out of the Trinity River is diverted to the San Joaquin Valley, and principally to Westlands Water District. Now Westlands Water District, as many of you know, was responsible for the Kesterton disaster. And there are lands in Westlands that have been identified as being toxic and polluting and lands that should be retired. If those lands are retired and the water is returned to the Trinity River, not only will the Trinity fisheries be restored, but the problems associated with Westlands, meaning the pollution of the San Joaquin River, pollution of the San Francisco Bay, which offers drinking water for two-thirds of California, all those problems could be solved. We don't need more surface storage. Building these dams in California is what caused -- was what's caused all the problems currently. We're sitting here talking about a fishery that's declined by 90 percent. Why? Principally, because a dam was built and 90 percent of the water was diverted. So the answer to California's water problems is not build more dams. The answer is conservation. And the Trinity River can be used as a shining

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example of habitat that has been restored, as an example of us being brought back to sanity by saying fish need water.

You can dredge a river, you can put bulldozers in the river, but fish aren't going to walk. Fish need water.

I appreciate all the consideration, all the time and the effort that all the agencies have put into the Trinity River. It's been studied for two decades. It is time now to move towards restoration, to move towards giving the river more water.

And we would encourage you to look at implementing a flow regime that allows the Trinity River to have 70 percent of its flows. Then we know that 70, along with mechanical restoration, can truly restore the fishery.

It's no longer a guessing game. This is our one chance to fix this river, to fix it as it was promised in the 1955 legislation.

We've waited long enough. There should be no further delays. Let's move forward a Record of Decision.

Let's move towards restoring this river.

Thank you.

PRESIDING OFFICER RUESINK: Thank you for your comments.

Our next speaker is Bernard Bryson.

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MR. BRYSON: I'll be quite short here. The nineteen fifty --

PRESIDING OFFICER RUESINK: And --

MR. BRYSON: I'm Bernard, B-e-r-n-a-r-d, Bryson, B-r-y-s-o-n, Redding, California.

The 1955 Trinity River Act, PL84-386, stated that the river diversions were not to be detrimental to the river.

The 1984 Trinity River Basin Fish and Wildlife Management Restoration Project Act, PL98-541, stated that natural fish and wildlife populations should be restored to levels approximating those which existed immediately prior to the construction of the Trinity diversion.

The proposed and recommended flow evaluation alternative is projected through the selected models to reach approximately 66 percent of those levels.

I have three questions.

First, is this projected two-thirds attainment of those levels sufficient to meet the intent of the above legislation?

Two, what criteria are proposed to measure attainment of the desired goals?

And third, what additional measures are proposed should the proposed measures fail to restore the river to the desired levels?

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Thank you.

PRESIDING OFFICER RUESINK: Thank you for your comments, Mr. Bryson.

Our next speaker is Oliver, S. Oliver.

MR. OLIVER: I might be just off the wall with my --

PRESIDING OFFICER RUESINK: Would you please state your name --

MR. OLIVER: Stuart Oliver.

PRESIDING OFFICER RUESINK: -- for the record and spell it, please?

MR. OLIVER: Stuart Oliver, S-t-u-a-r-t O-l-i-v-e-r, Oliver.

Pardon?

PRESIDING OFFICER RUESINK: Go ahead.

MR. OLIVER: As we know, this Whiskeytown and Trinity Dam diversion tunnels work very well. I know it's a gravity-fed tunnel. And it's a beautiful project that worked. And it's a beautiful engineering marvel. I'm suggesting something similar to that, only it would be a combination of tunnel and pumps.

And I live near the river myself. And I've seen it year after year where we had fifty to 80,000 cubic feet a second going down that river. And it's scary. But it's all wasted, going to that ocean. And I'd

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like to see something done about it.

And I wrote to the Bureau of Reclamation, oh, five or ten years ago, asking if they wouldn't make a study. And I think there should be a study of diverting this tremendous amount of water that's coming down the Sacramento, Pit and the McCloud rivers during these very wet winters when the water is no good to anybody. It's just going down that river. Shasta Dam can't use it, the Pit powerhouses can't use it.

And I'm suggesting that the Bureau make a study of diverting that water through pumps and tunnels over to the Trinity Dam, even if you have to raise the Trinity Dam level and make it a larger reservoir.

But I think those two months out of -- of many years, that water should be saved. And we need the work and -- we need the work in these counties. And we need the jobs.

But this is not some fly-by-night thing.

PG&E does this already down there by Fresno. And the Grand Coulee Dam, if you've ever visited that, you can see the tremendous pumps facilities they have. Pumps up to pretty good heights. And even if we had to have other reservoirs in between --

I know that the river is actually below somewhat of the Trinity reservoir. And so it needs to be pumped up

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somewhat to get it up into that level. But I would like to see a study made of that.

Well, that's pretty much it.

But they have proven, the PG&E has proven that this 95 – it's 95 percent efficient to do this. And if you pump the water over there to the Trinity Dam, you've got excess – that excess water to flow down the Trinity, and you've got excess water to go down to Tracy.

That's through the – through the Trinity powerhouse, the Carr powerhouse, the Spring Creek and the Keswick Dam. You're not wasting any electricity by using these pumps. And the PG&E has proven this is 95 percent efficient to do that.

Thank you very much.

BY PRESIDING OFFICER RUESINK: Thank you for your comments, Mr. Oliver.

Our next speaker is Dave Steinhauser.

MR. STEINHAUSER: Hi. My name is David Steinhauser, S-t-e-i-n-h-a-u-s-e-r.

And I'm involved in the communities along the Trinity River wearing different hats such as Board of Directors of Trinity County Chamber of Commerce, Board of Directors of Big Bar Community Development Group, a member of the Six Rivers Outfitter and Guide Association, and a member of the Trinity River Frontier Business Network.

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Tonight, however, I speak on behalf of my wife and myself as owners of a white water recreation business along the Trinity River since 1988 called Trinity River Rafting.

Thank you for the opportunity to comment on the draft EIS/EIR, a document that we have been awaiting a long time.

When I first received my copy of the DEIS/EIR, it appeared large, but after browsing through it I realized that it is mostly material that we have been hashing through for many years.

I have heard that some folks would like a 90-day extension on the comment period of this document, referring to the report's size.

But in my opinion, most anyone who has had an interest in the DEIS/EIR will find the material to be quite familiar and there is a very adequate summary.

I believe the comment period which extends to December 20th is long enough.

White water rafting has at least two levels of appeal. The adventure of white water and access to a relatively natural environment.

On the Trinity River, the importance of these two components are fairly well balanced because the most popular run, the Class 3 Pigeon Point Run, which starts at

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the confluence with the North Fork, is widely accessible and can be enjoyed by a broad spectrum of people.

For white water adventure, our company provides safety, competent river guides and quality equipment. And to run white water, we need to have adequate river flows.

For enjoying the river corridor, our company provides access and interpretation. And we need a quality environment to showcase.

Adequate river flows for river running on the Trinity River are defined in the DEIS/EIR as being above 300 cubic feet per second and below 8,000 cfs.

I would strongly qualify the 300 cfs minimum figure as being runable by kayaks as ten-foot rafts. Commercial rafts on the Trinity River are mostly 12-, 13- and 14-foot rafts, with occasional 16-footers.

These larger rafts don't fit down the river at 300 cubic feet per second when tributary inflow is small.

When I was first involved in commercial recreation on the Trinity, the dam releases in the summer was 300 cubic feet per second. And we were able to do this commercial activity by having the guide in a kayak and describing routes to people in ten-foot rafts.

Around 1990, the release in July and August and September was increased for the purpose of temperature controls to 450 cubic feet per second, which resulted in

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an explosion of rafting activity. It became reliably possible to run a full-sized raft with a guide down the river throughout the entire summer.

We now provide services to more people on a busy July or August weekend than we did during the entire season before the 450 cfs release.

So as part of my comment I would like to present this minimum flow for rafting distinction to you.

However, I do not believe that it strongly affects the implications of the options presented.

The only option that it affects is the 40 percent in-flow option, which, if changed to a 450 cfs minimum, would make recreational rafting even less viable, and if chosen, would probably put most raft companies out of business.

In terms of overall flow, either the flow evaluation alternative or the maximum flow alternative would provide more flows at optimum water levels while not dipping below 450 cubic feet per second during the busiest months for rafting, which are July and August.

I concur with the DEIS/EIR on its finding that these two alternatives would provide the most benefit to in-river recreational rafting.

Without lengthy elaboration, I believe that either the flow evaluation or maximum flow alternative would be

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the only options that could effectively and comprehensively promote a healthy river corridor. Although our business does not include a fish and guide service, watching a full-sized salmon or steelhead speed by inspires a similar amount of awe as viewing a bald eagle soaring overhead. Momentum from working in a community on a healthy river and the enthusiasm of presenting interpretation about such an environment is substantial.

Other alternatives are not only scary, but impractical as the probable result would be the listing of all anadromous fishes as endangered, with subsequent shutting down of river activities and cascading detrimental effects on businesses and communities along the Trinity River.

No party interested in Trinity River water can afford further degradation of the fisheries.

Thank you for your time.

PRESIDING OFFICER RUESINK: Thank you, Mr. Steinhauser.

Our next speaker is Darren Andolina. Would you coming forward, please.

MR. ANDOLINA: Hello. I'm Darren Andolina, A-n-d-o-l-i-n-a.

And I just love the Trinity River. And I think

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it's very special place.

And according to Mr. Johannessen's comments earlier that this is God's country, personally, I've never been anywhere that wasn't God's country.

And I think we ought to start listening to God.

And God created the river, the Trinity, that flowed. And I think human intervention is what's messed everything up. I don't think you can deny that the activities involved with building a dam have been -- have not been responsible for the declining in fisheries.

It might also be harvesting fish off the coast as well, but that's still another, you know, human intervention that's affected the Trinity.

I also -- I like EIS/EIR, but I think it is too reliant upon mechanical restoration.

On principle, I don't think that bulldozers should be allowed to try to fix the river. I mean, after all, they were what created the problem, building a dam. I think that water is what's needed to clear out the spawning habitat for the fish and just let nature do its work. And that's all that's needed.

Thank you.

PRESIDING OFFICER RUESINK: Thank you.

Randi Anderson.

MS. ANDERSON: Hi. My name is Randi

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Anderson, R-a-n-d-i A-n-d-e-r-s-o-n.

I've lived in Trinity County for 21 years. And during that time I worked for several years with the Resource Conservation District repairing the Grass Valley Creek watershed where there was much damage due to improper logging practices.

And during that time I learned a great deal about the processes that occurred in the river and came to understand, you know, what had gone wrong over time since the dam had been put in place.

And I've interviewed a lot of different people. I work as a wilderness guide and am a writer and work with the schools and put on story-telling events.

And during all of those different kinds of things that I've been involved in I've interviewed lots of different people, old people, young people, people who have lived on the river and have heard over and over again the stories that people really sadly reminisce about the river and the salmon runs. And it really has struck me.

One man in particular was a member of the Yurok Tribe -- and is a member of Yurok Tribe. Excuse me. He lives on the mouth of the Klamath. And he remembers when there were no roads and when they had to canoe back and forth up to the ocean and back to get their fish. And he told amazing stories about the salmon.

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And, you know, what has struck me about all this is the profound change that has occurred in -- not only in the river, but in people's lives and their livelihoods and in their memories and their spirituality and how they interact with the river.

Children nowadays don't interact with the river like they used to.

You know, the seasons used to draw people to the river. And it was kind of a whole poetic experience of humanity in that part of the land and all over the Pacific Northwest. And it doesn't really occur any more in these rivers. And it's really very sad.

I mean, when you see the look in people's eyes when they talk about the salmon, how it used to be, it's just -- it really -- it's real sad.

So I would really like to strongly urge you to support the preferred flow study option in light of that, in light of the science that supports it, in light of the people who live there and all of the animals and fish and everything that depends on that kind of system.

Thank you.

PRESIDING OFFICER RUESINK: Thank you.

Roger Sherwood.

Mr. Sherwood, before you begin, you did provide substantial comments this afternoon which are already part

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of our administrative record. I certainly want to give you the opportunity to speak again this evening, but I would urge you to maybe try to be as brief as you can –

MR. SHERWOOD: Okay.

PRESIDING OFFICER RUESINK: -- and to summarize some of those points.

MR. SHERWOOD: Okay.

PRESIDING OFFICER RUESINK: And, if necessary, I will limit your comments this evening.

MR. SHERWOOD: I understand. Thank you.

Okay. My name is Roger Sherwood, S-h-e-r-w-o-o-d. My address is Box 683, Big Bar, California. That's six months out of the year. The other six months is Redding, California.

I make a living by dredging the Trinity River, and I've done it for 12 years. I was an aerospace engineer out of Phoenix and I left that job because I wanted to come to God's country. I fell in love with the Trinity River.

Before coming on the Trinity River I spent four summers in Alaska in the Arctic Circle on the tundra. There's no pollution up there. The tundra is covered with blueberries. And there's a lot of salmon. There's so many salmon you can't

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believe it.

I have an associate with me today.

I had told you when I first came in, I got no notice of this meeting other than after 1:00 o'clock this afternoon, five after 1:00. That's why I was late for your first meeting. Okay?

PRESIDING OFFICER RUESINK: (Nods head.)

MR. SHERWOOD: I don't have much use for the newspapers because they're too biased. So I have to disallow the newspapers. I can't believe what I read in the newspapers anymore. I no longer believe in what they publish. That's just the way I feel.

I was looking at some old records. And the Altoona quick silver mine was one of the largest quick silver or mercury mine -- producing mines in California and in North America.

In one month they produced 10,000 flasks of mercury. And I asked a friend of mine over here, I said, "Well, Lamar," I said, "what does a flask of mercury weigh?"

He said, "Seventy-four pounds."

Well, that quick silver mine working for -- I know it went down to 5,000 foot deep. But then the thought occurred to me, where did all that mercury go to?

Well, it was used for mining operations on the

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Trinity River, Klamath, northern California. I'll just say that far, because --

Five pounds of mercury is a real small container. You can imagine a hundred years ago trying to transport a thousand pounds of mercury. You couldn't do it.

Anyhow, my belief is -- I've got a background in conservation, as I mentioned earlier in the meeting this afternoon.

I left Phoenix as an aerospace engineer and moved up to the Trinity River in July of '88 because I liked getting away from the pollution of Phoenix and the pristine environment.

Dredging the Trinity River, which is what I did yesterday afternoon, that's why I -- that's why I'm here -- I have watched in the last 13 years the personality of the Trinity River change.

I have only seen it for 13 years, but I do know -- I've heard -- I've talked to old timers and they said when Highway 299 was built -- and I'm talking prior to the construction of the Trinity Dam -- they could look across the Trinity River and see fresh gravel. They even saw nuggets of gold in the gravel. They saw fish all over the place.

Now, when the Trinity Dam was built, they said it wouldn't hurt the environment. Well, it's different.

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You guys don't have all the answers. I think I've got some.

But Mount St. Helens blew up back in the early 80's, the Department of Interior, Forest Service, BLM, whoever, got over there and they well, we can do -- we can restore the devastation that Mount St. Helens created.

I walked on Mount St. Helens in July 5th of 1983. I stood as far as the ribbons would allow me to walk and I saw that devastation. I personally walked it.

Anyhow, they tried to reclaim the area. They brought in plants from Asia and whatever for ground cover. What they found out ten years later -- or six years later is if they had just left it alone, that the area, Mother Nature, would have healed itself, because volcanos have actually erupted in North America before man got involved with them. I'm just saying it would have done it on its own. Okay?

And it did better than what the engineers tried to do and what their -- the plants they introduced to the Mount St. Helens area actually messed up and interfered with the environment.

It slowed down Mother Nature's own reforestation and restoration program that man interfered with and stopped. And that's on record.

The -- I'm going to get back to the Trinity River

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now.

Okay. Watching the Trinity River when I came in July of '88, I saw – I got some mining claims on the Trinity River. I do dredging. But I saw old wrecked cars, I saw junk all over the river. And I thought to myself, here's a beautiful place, and the men are trashing it.

Charlie Fitch, up until January of this year, was the Chief Ranger in Big Bar. I've talked to Charlie many times.

Well, when I picked up a bunch of mining claims on the Trinity River, six, eight miles of the river, whatever it was, I said to Charlie, I said, "Charlie, don't worry about cleaning the trash up on my mining claims. I will personally pick up the trash."

And nobody pays me a salary. I do it on my own as an independent entity, and I do not get a paycheck. So this saved – Charlie -- Charlie thought "Well, doggone, this is nice. Here Roger is, going over there picking up" –

And I did. For many weeks and months every season, I'd walk around with five-gallon buckets in my hand, picked up the cigarette butts, picked up the trash the fisherman discarded, and the kayakers and the rafters. And I don't mean to pick on them, but I tell you

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what, when they left, the trash was on my claims. And I picked it up. Nobody asked me to do it. I did it because it was the right thing to do for the environment. That's the attitude I have and that's the attitude I have today.

I would pick up trash on my claims as long as I own those claims, and nobody has to pay me a penny to do it.

Now, the thing I see coming is -- I've got friends that are geologists. And for – one's a certified geologist with the State of California. And his business is environmental cleanup. He gets paid a couple thousand a week to be a consultant to go over and do environmental cleanups for disasters all over to western United States, California and Arizona and Nevada.

I've talked with -- his name -- his first name is Dave. I don't want to get him in any more trouble already than he – than I can do. But I talked to Dave. And he walked my mining claims with me. Dave knows how environmentally conscious I am. Dave is also a dredger, which I am. I'm a dredger.

When I left aerospace engineering 12 years ago, I quit a weekly paycheck. And my income was just like falling off a cliff. Bingo.

You try working five years with no paycheck. I mean, even the jobs you people hold today – and I don't

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mean to pick on you – how long you would stay with your job if you didn't get paid? How long would you stay?

PRESIDING OFFICER RUESINK: Mr. Sherwood, could I –

MR. SHERWOOD: Okay.

PRESIDING OFFICER RUESINK: -- have you focus –

MR. SHERWOOD: Okay.

PRESIDING OFFICER RUESINK: -- on the Trinity River –

MR. SHERWOOD: Okay. I'm sorry. I don't mean to attack anybody.

PRESIDING OFFICER RUESINK: – and the document that --

MR. SHERWOOD: Okay.

Now, ten years later the Trinity – the shores of the Trinity River are cleaned up. Charlie Fitch when he retired, I talked to Charlie before he retired. I said, "Charlie," I said, "look how clean the river is."

And then we started joking around. I said, "Charlie," I said, "I don't mean what the flood did in '97." I said, "Look how clean the land is."

Because what happened, the people who were living and using the river and dredging on the river started waking up. And between Fish & Game and the Forest Service

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trying to educate them to say, "Hey, look, you don't trash the river."

Well, 200 years of using the river – and we'll go back to that 10,000 flasks that the quick silver mine dumped into the river, let's say maybe not the Trinity, the rivers, because it was used for mining.

I am guessing there's between a hundred and 1,000 pounds of mercury per mile on the Trinity River. And the only way you can tell me that it is not there is to dredge every cubic yard of that river.

And at the bottom of the river you will find – I've done it. I'll find puddles of mercury on the bedrock.

The gold recovery in the river, 80 percent of it or more, that is mercury on it. So that mercury is breaking up into little microscopic nodules or whatever. It's polluting the fish, it's polluting the water.

Lake Michigan was closed in the '60's and '70's because of mercury poisoning to the fish.

What I say is this, I can create jobs, we can create jobs. I've got a pilot operation going where I can go and dredge the river.

And the neat thing about the river is if you want to take a quarter mile of river and clean it up, just a water mile, one quarter mile of the river – say there's a

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road that does down to the river, and you clean that up. You take all the bedrock out. Now, I'm talking go -- I mean all the overburden out. And it could be 20 feet deep. So in a quarter mile you might have ten million cubic yards of overburden. The silt gets cleaned up of mercury and lead, you get it out. I can do it. You haul it away in dump trucks, give it back to the farmers. It took 200 years or a thousand years for Mother Nature to make it, but get it before it goes into the ocean and gets really contaminated. But the neat thing is if you clean up a quarter mile stretch of the river, I'm saying to bedrock, let's say the Big Bar area or Del Loma, what -- the neat things that happen -- say you spend a summer doing it, you have eight or ten dredges in there -- I'm talking about getting up all the lead and the mercury too. The hunters are shooting the ducks. All that lead's laying in the water. I find it all the time. But what happens is, the winter the flood comes, well, it turns around and washing in the hole that you dredged the year before. Happens to me every year. I had a hole dredged in the Trinity River two years ago 25 deep and 60 feet across. You could have put a four-unit apartment building inside the hole I dredged.

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Do you know what? I went back the next year, it was totally filled in. We call it fluff. But what I'm saying is that, realistically -- I wrote a letter to President Clinton. He did never -- he never replied. There's a way to clean up the Trinity River by stages. You clean it to bedrock, get rid of the small stuff. Get the lead and the mercury out. The mercury and the lead would be a byproduct that could be sold. We could use local people. I'm forming a company to do just this on a -- on a -- on my own basis, independent of you people. But the thing I see -- you're concerned about cleaning up the Trinity River. Let's get everything out there. Don't just pick up the overburden that's ten feet deep, because you didn't get the contaminated materials out of it. Let's get the old dredges out of it, let's get the mercury out, get the lead out of it, and then start cleaning it up by stages. And then -- it will take a couple -- it will take 20 years to do it, but you can start doing it now. Say there's ten spots on the Trinity River where you have road access and pickup trucks can haul the overburden out. I wash it and clean it, get the mercury

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out, I get the lead out. I got the contaminants out, the old iron, roust whatever. Do a quarter mile stretch of the river. The winter floods come in. You go right back to that same spot and work it again, only you -- what took three months to do you can now do in three weeks, because it's just fluff, it's loose. You get that out, haul that away in dump trucks. I classify it: Pea gravel, sand, silt, gravels, one-inch or two-inch diameter rocks. You use trommels to do that. But I can put local people to work making a good salary. And in the process of doing it, restore and revitalize Trinity County. If you take look -- like J&M Tackle over in Junction City had to close his doors. That man, I knew him personally. Thirteen years he worked on the river and he thought he could make it. But the -- the restrictions placed on dredging -- and I'm not saying to interfere with the rafting or anything, but the neat part of this is you can get a -- it can pay for itself just like Boulder Dam did. They built Boulder Dam at a cost of hundreds of millions of dollars. A byproduct was the electricity that paid for the dam. So the dam didn't really cost anything, but it put everything to work. And it's a perpetual

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source of electricity for, you know, California and whatever. This kind of work that I'm talking about can be done on a small scale, say a quarter of a mile at a time, eight or ten different locations, get the mercury out. I don't know what mercury sells for anymore. But put local people to work. And then truck it out. And in the process of doing it, by getting the overburden out -- say you only do one percent the first year, and after a couple of years you do two, three, four five percent, we're talking millions of cubic yards, literally, every year being deposited. The overburden level would go down shallower and it would take you less water to have you in six or eight feet of water.

PRESIDING OFFICER RUESINK: Mr. Sherwood, could I have you wrap up in about --

MR. SHERWOOD: Sure.

PRESIDING OFFICER RUESINK: -- a minute here.

MR. SHERWOOD: All right.

PRESIDING OFFICER RUESINK: Thank you.

MR. SHERWOOD: I agree -- I would like to talk with Senator Johannessen before he leaves tonight, unless he's already gone.

DR. MUELLER: He's right back there.

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MR. SHERWOOD: Okay.

But this can be done and it can be done now. And it can be done in a manner in which, instead of just costing money, it can restore an economy, it --

People who live in Weaverville and Trinity County live there because of the environment, but their families and sons have to leave because they can't feed their children, put their children in school, because there is no work.

But I could put a whole bunch of people to work on it. You know, I'd have to have a government grant or something to do a small operation, but the thing is you guys would see with your own eyes --

And I'm not talking in the year 2020 either. I think the reason that year comes up, by that time there I'll be 75 years old and I'll say, "What was the Trinity River? Huh?"

That's why they're talking about something 20 years down the road. We don't have all the answers.

But the thing is if you can take little -- a little at a time and start cleaning it up --

It took 30 to 40 years to mess the river up. If you consistently work 30 to 40 years to clean the river up, it would be a lot cleaner.

And every truckload of mercury that goes out of

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that river -- like again I've got facts from the Altoona quick silver mine to -- to -- to --

Oh, incidentally, the LaGrange Mine at one time was the world's largest hydraulic mining operation. And it's located between Weaverville and Junction City. And that was at one time the world's largest hydraulic operation.

One of the last stages of hydraulic mining was the use of mercury. And that's all in the river.

And incidentally, water does not push mercury to the ocean. Mercury stays right in the river.

PRESIDING OFFICER RUESINK: Thank you, Mr. Sherwood.

David Bish?

MR. BISH: Good evening. My name is David Bish, B-i-s-h. I just have a very brief comment this evening.

As we go through this whole process, it's obvious that economics is the name of the game here. You know, saving the fish, the positives of that, and then what are the costs and who should bear them.

I just wanted to throw out one indirect economic benefit that quite often gets overlooked in these sort of analyses.

I moved her in 1989 from Texas. I have a business here, I have employees here. The reason I moved to this

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area is specifically for white water boating.

I consider the Trinity River my home river. It's the river that we use most extensively. And the flows have -- you know, it's a beautiful area. And it was enough to induce me to move halfway across the country.

Increasing the river flows, in addition to helping the fish populations, also has the benefit of increasing people like myself who may move here and bring economic growth in the process.

And that sort of analysis -- I know there's one gentleman indicated 66 jobs would be created. I suspect with increased flows, there will be at least 66 more white water boaters moving here. So just factor these sort of things in here.

And in that regard, I would say, you know, I certainly would support the preferred alternative, increasing the flows for the fish as well as white water boating.

Thank you.

PRESIDING OFFICER RUESINK: Thank you, Mr. Bish.

We have heard now from everyone that had filled out a yellow card and expressing a desire to make a statement this evening.

If anyone else here would like to make a statement,

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I would ask that you go to the registration table and fill out a card, and then we will give you the opportunity do so.

If there are no more cards right now, we will take a break and reconvene if someone else does register to speak. We're now off the record.

(Recess taken, 7:14 p.m. - 7:22 p.m.)

PRESIDING OFFICER RUESINK: I'll reconvene the hearing now. We're back on record.

We do have one other person that's indicated they would like to make a statement.

But before we do that, I would like to introduce John Engbring sitting to my immediate left. Mary Ellen Mueller was the Fish and Wildlife Service representative and had to leave for another commitment that I think she has early in the morning than tomorrow.

And so John is the Fish and Wildlife Service official that's listening to any other statements that we have this evening.

The next speaker is James Holden.

MR. HOLDEN: Hello. I would just like to say --

PRESIDING OFFICER RUESINK: Could I have you state your name and spell it for the record, please?

MR. HOLDEN: Yeah. James Holden, H-o-l-d-e-n.

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And I work with SWAG which works in the area on restoring watersheds and also with Shasta College on some watershed restoration projects.

And what I'm noticing and what I've noticed from like the Saelzer Dam discussions that we're having is all these dams, they're useful at one time, but over time when we start weighing them against the costs of the environment, we're finding that these dams aren't necessarily the solution to the problems we're having.

We're trying to urbanize areas that don't really have any means of supporting population on its own.

And you're saying here that in 20 years, you know, we're going -- we're going to take water from southern California. They're not going to let us. This is a very rural area with no vote.

How are you going to take water from there and say that 20 years from now we might have 66 percent of the fish when we don't really know whether or not this is going to be the route?

My basic point is is any humanization to the rivers are going to lead a decline in salmonoid and fish habitat.

The Trinity River, no matter what we do to it, the temperature is still not going to be the same because of the dam raising the temperature. No matter what we release the flows at, it's never going to be the same as

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it is now.

So if you're going to weight it against the environment, the vote's going to win down south. I don't really don't think it's going to matter too much what impact the environment has.

It's who needs the water, who's going to get it.

And that's about all I want to say.

PRESIDING OFFICER RUESINK: Thank you for your comments.

Again, that's all of the slips that I have of those wishing to speak. If anyone else in the audience would like to speak, please go to the registration table and fill out one of the yellow cards.

And I did see a hand raised. So we'll go off the record briefly, but let's try to get that person back on the record very shortly.

We're off the record.

(Recess taken, 7:25 p.m. - 7:27 p.m.)

PRESIDING OFFICER RUESINK: I'd like the reconvene the hearing. We're back on the record.

The next speaker is Eric Ayers. Would you state your name and spell it for the record please?

MR. HOLDEN: It's E-r-i-c A-y-e-r-s.

I'm here as a citizen of Shasta County, member of the Shasta Paddlers, just to say to the board you heard

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some comments on Trinity County and their influx with the flows.

And here as a member of the Shasta Paddlers. We support the flow in the EIR hearing tonight for the additional water flows to help out with the fish flows and the recreation from fisheries to white water enthusiasts.

Also on the river paddling, you have the opportunity to speak with different people that come from around the world to paddle. Believe it or not, last year there was some people from Costa Rica paddling on the Trinity River, which I thought was really a neat thing.

Amazing to be able to speak with them.

And some people from -- all the way from back east paddling on the Trinity River. And the reason they were here in January was because the water was at a higher level. And if the water level was at a higher level during the summer, they would be here during the summer.

And that in turn brings money to Trinity County that people might not realize. And I just thought that might be something to consider with that initial water flow, that people are going to come and utilize the resource that they have for fishing, people coming and spending money on fishing the river, enjoying the river, seeing its natural environment.

Thank you.

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PRESIDING OFFICER RUESINK: Thank you, Mr. Ayres.

Once again, I have no additional slips from people wishing to make a statement. And so we'll go off the record temporarily.

(Recess taken, 7:28 p.m. - 8:00 p.m.)

PRESIDING OFFICER RUESINK: I'd like to go back on the record, please. The hearing is reconvened.

We are back on the record.

I have no other appearance slips. And we're at the end of our scheduled time.

So on behalf of the US Fish and Wildlife Service and the cooperating agencies that have been here with us this evening, we appreciate the time and effort that all of you took to be here, we appreciate the comments that you've provided to us. They have been very informative and will be fully considered in coming to the final decision.

The hearing is hereby closed. We're off the record

(Whereupon the hearing concluded at 8:00 p.m.)

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CERTIFICATE OF REPORTER

I, CLIFFORD M. FISHER, a Certified Shorthand Reporter, licensed by the State of California, License No. 2727, being empowered to administer oaths and affirmations pursuant to Section 2093(b) of the Code of Civil Procedure, do hereby certify:

That the foregoing proceedings were taken in stenographic shorthand before me at the time and place herein stated, and were thereafter transcribed under my direction by computer-aided transcription;

That the foregoing transcript constitutes a full, true, and accurate record of the proceedings which took place;

That I am not of counsel or attorney for any of the parties hereto, or in any way interested in the event of this cause, and that I am not related to any of the parties hereto.

IN WITNESS WHEREOF, I have hereunto subscribed my signature on this 2nd day of December, 1999.

____

CLIFFORD M. FISHER

---o0o---

PC-2

U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
PUBLIC HEARING
regarding
ENVIRONMENTAL IMPACT STATEMENT/
ENVIRONMENTAL IMPACT REPORT FOR THE TRINITY RIVER
MAINSTEM FISHERY RESTORATION
SACRAMENTO GRAND BALLROOM
629 J STREET
SACRAMENTO, CALIFORNIA
TUESDAY, NOVEMBER 18, 1999
1:00 p.m.

RECEIVED - REG 1-AES
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PRESIDING: ROBERT RUESINK, Supervisor
U.S. Fish and Wildlife Service
Snake River Basin Office
Boise, Idaho

APPEARING: MICHAEL SPEAR, Supervisor
U.S. Fish and Wildlife Service
California/Nevada Operations Office
2800 Cottage Way, Room W-2606
Sacramento, California 95825

KIRK RODGERS, Regional Director,
Mid-Pacific Region
Bureau of Reclamation
Sacramento, California

CHRIS ERIKSON, County Supervisor
Trinity County
Hayfork, California

REPORTED BY: MARYANN VALENOTI, RPR, CSR #11266
JOB NO. 01-84905

HEARING OFFICER RUESINK: Please take your seats. We are have not seen a representative from the Hoopa Valley Tribe, but I do want to open the hearing now, we are on the record.

Good afternoon. On behalf of the United States Fish and Wildlife Service, I welcome you to this public hearing. The U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, Hoopa Valley Tribe and Trinity County are conducting a joint process for taking comments in the Draft Environmental Impact Statement Environmental Impact Report for the Trinity River Mainstem Fisher Restoration.

My name is Robert Ruesink, last name is R-U-E-S -- as in Sierra -- I-N-K. I'm the supervisor for the Fish and Wildlife Service, Snake River Basin Office in Boise, Idaho, and this afternoon I will be serving as a presiding official for this hearing.

Our scheduled time for the hearing this afternoon is from 1 to 3 p.m., and we will reconvene again this evening from 6 to 8 p.m.. At the table with me are representatives from the Fish and Wildlife Service, U.S. Bureau of Reclamation and Trinity County. In a moment we will hear more from these individuals. Other representatives from the U.S. Fish and Wildlife Service are at the registration and information tables in the

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lobby outside this room. They have additional material there that I would encourage you to look at and they will be at that table to answer questions that you may have regarding the topic of this hearing.

At this point I'd like to introduce Mike Spear, who is the Fish and Wildlife Service representative to make the official statement of the service, Mike.

MR. SPEAR: Good afternoon. My name is Mike Spear, Fish and Wildlife Service. I'm manager of our California-Nevada Operations Office. Release of the draft Trinity River Mainstem Fishery Restoration EIS/EIR is the latest step in the process that Congress initiated many years ago to address the long-standing concerns about the affects of water diversion, instream habitat, sedimentation and watershed management issues in the Trinity River system's health, including its once abundant salmon runs.

Congress directed the Secretary of the Interior to evaluate the impacts of these issues and to take steps to restore the health of the Trinity River system. In response to this mandate, the Department of the Interior has been actively participating in the study for more than 15 years. This has been a collaborative effort by the Fish and Wildlife Service, U.S. Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County.

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The EIS/EIR summarizes the research that has been undertaken over the past several years and identifies for public comment several potential alternatives for restoring the Trinity River system. Impacts considered under NEPA and CEQA are not limited to impacts to the fishery resources of the Trinity River, but include all the impacts of the action affecting the human environment. The department encourages public comment on all aspects of the draft EIS/EIR.

This public hearing is part of the common process in the draft EIS/EIR and will be closed December 20, 1999. A record of decisions expected in the early spring of 2000. On behalf of the service, Bureau of Reclamation, Hoopa Valley Tribe and Trinity County, I thank you for the effort you've made to attend this meeting and also thank you in advance for your comments.

Now we will hear some introductory remarks from Supervisor Chris Erikson, the representative of Trinity count.

MR. ERIKSON: Thank you. I'm Chris Erikson, County Supervisor in Trinity County, and Trinity County is the lead agency for the CEQA evaluation and that's why we are a part of this hearing. Thank you.

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MR. RODGERS: Good afternoon, my name is Kirk Rodgers. I'm the Deputy Regional Director for the Mid-Pacific Region and the Bureau of Reclamation.

The Trinity River Division is part of our Northern California area office. We have operational responsibilities on the river, along with operation or maintenance of some of the structures that are found and owned by the Federal Bureau of Reclamation there. So we are -- I'm pleased to hear comments on this milestone that we have reached on completing this EIS. We are very interested in hearing your thoughts and views on this and taking that message back to those who will be able to act upon those. Thank you.

HEARING OFFICER RUESINK: Thank you. Public comments on the draft EIS/EIR will be accepted until December 20, 1999. After review and consideration of your comments, the four co-lead agencies, along with the cooperating agencies, will prepare a final Environmental Impact Statement Environmental Impact Report. The purpose of this hearing is to receive your comments on the draft documents. Comments on all aspects of the alternatives described in those documents are very important and will be carefully considered. Because of the importance of your comments, it is necessary that we follow certain procedures here this

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afternoon. If you want to present comments at this hearing, please register at the table outside this room. When you register indicate any organization that you are representing. When you are called to present your comments, please come forward to the microphone in front. Begin your presentation by stating your full name, spell it for the record and indicate if you are representing an organization.

This is an informal meeting and, therefore, you will not be questioned or cross-examined in connection with your comments. Your comments or questions are being reported by the Reporter to preserve them for the record. Please keep in mind that the Reporter will not record any statements from the audience or which are made to the audience. Comments must be made into the microphone and to the agency representatives at the front table. If you have a copy of your statement, please leave it with the Reporter or with the registration staff. If you are reading your testimony, we ask that you please read slowly enough for the Reporter to be able to record your comments verbatim.

Instead of presenting oral comments here this afternoon, we are or in addition to the oral comments, you may submit comments in writing. Written comments may be submitted today to the staff at the registration

table or they may be mailed to Mr. Joe Polos, P-O-L-O-S, U.S. Fish and Wildlife Service. 1655 Heindon, H-E-I-N-D-O-N, Road in Arcata, California, 95521. This address is also at the registration and information tables outside this room.

Written comments will be accepted through December 20, 1999. Written comments are given the same consideration as oral comments that are presented here this afternoon. At this time we are ready for the first speaker, Mr. Felix Smith. Would you come to the microphone, please. State your name, spell it for the record, identify who you represent and begin your comments.

MR. SMITH: My name Felix E. Smith. I represent myself as a taxpayer. Do you want my address?

MS. REPORTER: No.

MR. SMITH: Probably one of the only few people in the room, if there are others. I don't know, that worked on the Trinity River in 1956 to '58. I saw the massive runs of Chinook salmon that used to go up the Trinity.

What happened in the Trinity, in my opinion, violates what has now been a decision on Fryant by the recent court in the lawsuit between NRDC and the Bureau.

I also am aware in the PEIS just issued that I

got at my house on the CVPIA there are confusing figures. It says the Trinity River, for the Trinity River flow pattern is 390,000 acre feet in critical dry years to 750,000 acre feet in wet years. This is Attachment G.

In the paragraph down it says, "The recommended flow range from 369,000 acre feet to 817,000 acre feet in wet years." Automatically we have a confusion here of about 50,000 acre feet. Should the water be released to the Trinity, the answer is yes. It must be consistent with state law.

State law in my opinion has been violated in the last 30 years on the Trinity, and that's again 5937. If you are looking for a place to get that water, look to the west side of the San Joaquin Valley. Both the Bureau and the Fish and Wildlife Service has massaged the language often enough that we are continued -- "we" being the feds -- to deliver irrigation water to irrigate selenium soils on the west side. The drainage from those selenium soils is raising havoc with fish, wildlife and other species in the San Joaquin system.

In my opinion it's time now with the decision on Fryant, that both San Joaquin/Fryant and the Trinity River Fishery and wildlife resources be restored, both flows and water quality are needed. I recommend that

the 369,000 acre feet range to 817,000 acre feet be instituted at the earliest possible time. Thank you.

HEARING OFFICER RUESINK: Thank you, Mr. Smith, for your comments. At this time we do not have anyone else that's registered to speak. If some of you in the audience wish to make a statement at this time, please go to the registration table and fill out one of these cards. I'll give you just a minute if anyone wants to do that at this time.

If there's no one that wishes to speak at this time, we will take a break.

We are off the record.

(Whereupon, a recess was taken.)

HEARING OFFICER RUESINK: We are back on the record. No one else has signed up to speak. We are at the end of the scheduled time for the afternoon hearing.

I would remind you that we will reconvene this evening from 6 to 8 p.m.. This meeting is closed. We are off the record.

(Hearing adjourned at 3:01 p.m.)

CERTIFICATE OF REPORTER

I, MARYANN H. VALENOTI, a Registered Professional Reporter and Certified Shorthand Reporter, hereby certify that the testimony in the foregoing proceedings was taken by me, a disinterested person, at the time and place therein stated, and that the testimony was thereafter reduced to typewriting, by computer, under my direction and supervision.

I further certify that I am not of counsel or attorney for either or any of the parties to the said proceedings, nor in any way interested in the event of this cause, and that I am not related to any of the parties thereto.

DATED: DECEMBER 8, 1999

____

MARYANN VALENOTI, RPR, CSR
CERTIFIED SHORTHAND REPORTER
No. 11266

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U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
PUBLIC HEARING
regarding
ENVIRONMENTAL IMPACT STATEMENT/
ENVIRONMENTAL IMPACT REPORT FOR THE TRINITY RIVER
MAINSTEM FISHERY RESTORATION
SACRAMENTO GRAND BALLROOM
629 J STREET
SACRAMENTO, CALIFORNIA
TUESDAY, NOVEMBER 18, 1999
6 p.m.

PRESIDING: ROBERT RUESINK, Supervisor
U.S. Fish and Wildlife Service
Snake River Basin Office
Boise, Idaho

APPEARING: MICHAEL SPEAR, Supervisor
U.S. Fish and Wildlife Service
California/Nevada Operations Office
2800 Cottage Way, Room W-2606
Sacramento, California 95825

MIKE RYAN, Regional Director,
Mid-Pacific Region
Bureau of Reclamation
Sacramento, California

MIKE ORCUTT, Director,
Natural Resources Program
Hoopa Valley Tribe
Hoopa, California

CHRIS ERIKSON, County Supervisor
Trinity County
Hayfork, California.

REPORTED BY: MARYANN VALENOTI, RPR, CSR #11266
JOB NO. 01-84905

HEARING OFFICER RUESINK: Thank you. We are on the record. Good evening. On behalf of the United States Fish and Wildlife Service, I welcome you to this public hearing. The United States Fish and Wildlife Service, U.S. Bureau of Reclamation, Hoopa Valley Tribe and Trinity County are conducting a joint process for taking comments on the Draft Environmental Impact Statement/Environmental Impact Report for the Trinity River Mainstem Fishery Restoration. My name is Robert Ruesink. The last name is R-U-E-S -- as in Sierra -- I-N-K. I'm the supervisor for the Fish and Wildlife Service in Boise, Idaho, and tonight I will be serving as a presiding official for this hearing.

With me at the table are representatives from the Fish and Wildlife Service, Hoopa Valley Tribe, United States Bureau of Reclamation and Trinity County, and they'll introduce themselves and make a statement in just a minute.

Other representatives of the U.S. Fish and Wildlife Service are also here at the registration and information table outside this room. You will find some additional written material there, and staff will be available to answer questions that you may have about the Trinity River restoration.

At this point I would like to introduce Mike

Spear, who will give the services opening statement.

MR. SPEAR: Good evening. My name is Mike Spear. I'm the California-Nevada Operations Manager for the Fish and Wildlife Service. Release of the Draft Trinity River Mainstem Fishery Restoration EIS/EIR is the latest step in the process that Congress initiated many years ago to address long-standing concerns about the effects of water diversion, instream habitat, sedimentation and watershed management on the Trinity River system's health, including its once abundant salmon runs.

Congress directed the Secretary of the Interior to evaluate the impacts of these issues and to take steps to restore the health of the Trinity River system. In response to this Congressional mandate, the Department of the Interior has been actively participating in a study for more than 15 years. This has been a collaborative effort lead by the U.S. Fish and Wildlife Service, for the Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County. EIS/EIR summarizes the research that has been undertaken over the past several years and identifies for public comment several potential alternatives for restoring the Trinity River system. Impacts considered under the NEPA and CEQA are not limited to impacts of the fishery resources

of the Trinity River, but include all impacts to the action effecting the human environment.

The Department encourages public comment on all aspects of the Draft EIS/EIR. This public hearing is part of the comment process on the Draft EIS/EIR. It will be closed December 20, 1999. A record of decision is expected in the early spring of 2000.

On behalf of the Service, Bureau of Reclamation, the tribe, Hoopa Valley Tribe and Trinity County, I thank you for the effort you've made to attend this meeting and also thank you in advance for your comments.

Now, here to submit remarks from the CEQA league, Supervisor Chris Erikson, representative of Trinity County.

MR. ERIKSON: Thanks. I'm Chris Erikson. I'm a supervisor from Trinity County, and Trinity County's position in this is that we are the lead agency for the review under CEQA. I'll now introduce Mike Orcutt from the Hoopa Valley Tribe.

MR. ORCUTT: Good evening. I thank you as well for being here, and I guess I just have some real brief comments.

The resource that we are talking about, the fisheries and the wildlife resources of the basin, our tribe is dependent on it, and historically and

contemporarily. The real survival of the people at one time are really tied to that, the health of that resource. The tribe's involvement in this process, the development of the NEPA document we've been involved from the beginning, and our sole purpose in being there is one of which a lot of the information, supplemental information here shows that our species are listed and proposed for listing under the Endangered Species Act and that simply is not something that we choose to see happen. So that's the main reason we've been involved.

I would also make the comment that the relationship, the collaborative approach that's been used here is somewhat unique in which case and indian tribe has participated with the Federal Trustees in a development of this document, and I guess I just thank you in advance for your comments and I'm glad everyone's here tonight.

MR. RYAN: Good evening. My name is Mike Ryan. I'm the Northern California Area Manager for the U.S. Bureau of Reclamation. A portion of my job responsibilities include the Trinity River Division, the Bureau of Reclamation Central Valley Project.

HEARING OFFICER RUESINK: Thank you. Public comments on the draft EIS/EIR will be accepted until December 20, 1999. After review and consideration

of your comments, the four co-lead agencies, along with the cooperating agencies will prepare a Final EIS/EIR. The purpose of this hearing is to receive your comments on those draft documents. Comments on all aspects of the alternatives described in the documents are very important and will be carefully considered. Because of the importance of your comments, it is necessary that we follow certain procedures here this evening.

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Page 6

of any written material to which you refer with the Reporter or with the registration staff. If you are reading your testimony, we ask that you please read slowly enough for the Reporter to be able to record your comments. Instead of presenting oral comments here this evening or in addition to oral comments, you may submit comments in writing. Written comments may be submitted today to the staff at the registration table or they may be mailed to Mr. Joe Polos, P-O-L-O-S, U.S. Fish and Wildlife Service, 1655 Heindon, that's H-E-I-N-D-O-N, Road, Arcata, California, 95521. That address is also available at the registration and information tables in the lobby. Written comments will be accepted through December 20, 1999. Written comments are given the same consideration as oral comments presented here.

At this time we are ready for our first speaker. Mr. Byron Leydecker, would you please come to the microphone, state your name and spell it for the record and identify who you represent and begin your comments.

MR. LEYDECKER: Thank you, Mr. Chairman, members representing the agencies involved in the preparation of this document, we welcome this opportunity to appear before you and to offer our comments.

My name is Byron, B-Y-R-O-N, Leydecker,

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L-E-Y-D-E-C-K-E-R, and I am the chair of Friends of the Trinity River.

We will offer written comments at a later date, but we would like to make some comments tonight.

Friends of the Trinity River believes based upon the original Trinity River Division legislation and subsequent legislation that no more than 30 percent of the River's water should be diverted. The Federal Government's promises dating from the early 1950s in an effort to gain approval to construct the dam, those promises must be honored at long last.

Given the current CALFED effort to cite an ongoing example of assurances people will be asked to be relying upon, people must actually see, they must be able to believe and they must be willing to accept that their government has not lied to them, that its assurances to its citizens are fulfilled.

We believe the Environmental Impact Statement Report inaccurately spreads adverse power cost impacts pro rata on the county-by-county basis. In fact, these costs are based upon individual contracts, not on a pro rata county-by-county basis and this data should be revised.

In addition, Trinity County never has been provided with a preferential power rates dictated by law

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in the Trinity River Division Act of 1955, and its resident victims apparently now are expected to pay apparently about $11 million to implement restoration programs, as well as to absorb modestly increased power costs. The final EIS/EIR should reflect that the Trinity Public Utilities District will be exempt from all costs associated with any lost power generation, and preferential rate treatment should be enforced.

In addition, with a non-reauthorization of the restoration program, all power interests now are paying a disproportionate share of Trinity restoration costs at 70 percent, with the irrigators paying 30 percent. Thus power interests are subsidizing a handful, a bare handful of welfare beneficiary corporate type agro business interest, and even this unfair funding for the restoration program is not assured. So the Secretary should take further action beyond or included in his record of decision to make certain that program costs are shared equitably. He must also assure that critical watershed mechanical restoration activities are funded adequately. This is imported empirically and rationally and speaks volumes for needed action, to say nothing of supporting science and are the River's restorations best ally beyond water. This also is consistent with the President's Forest Plan, the Option 9 plan and should

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have assured funding until necessary watershed rehabilitation projects are completed and that's a reasonably finite effort.

The Secretary also should act to make certain that the restoration program otherwise is funded properly to accomplish its purpose. That issue is in doubt as we stand here. Unlike Option 9, this restoration program must be funded adequately or restoration objectives will fail, government mandates for no harm to the Trinity's fisheries and wildlife, a quote from the 1955 Act that is, will become a permanent fraud upon this country's citizens and any sense of trust in the government will be shattered, and properly so I might add.

And finally, I just might remind persons of an old truism, fish cannot walk. Thank you very much.

HEARING OFFICER RUESINK: Thank you for your comments, Mr. Leydecker. Our next speaker is Don Frogner.

MR. FROGNER: My name is Don Frogner, F-R-O-G-N-E-R. I'm a resident of Placer County, but I own property in Trinity County. I guess I fished the Trinity for several years. I've fished numerous rivers across the west and Canada, and I take a look at what the EIS is doing, and I look hypothetically consider if

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the Trinity River and Lewiston Dams and the Tunnel to Whiskeytown had not been built today and if we were to discuss building them now, I seriously doubt if they would be built today for the following reasons: The economics, the return on investment is not there. As a PBS television report made on Cadillac deserts. This was done in 1957, probably designed in 1954, it would be just too expensive to do today. I think the environmental concerns would also even eliminate having this -- these dams and tunnels built. There is no data to support diverting 90 percent of the water with no impact to the river. There's other alternatives. Farmers could choose to grow different crops, use environmental concerns to save water, and I think the political climate of today knowing they can't build the Auburn Dam, I don't think they could build the Lewiston Dam and Trinity Dam and the Tunnel to Whiskeytown.

The building of Trinity, Lewiston Dams and Tunnel to Whiskeytown was based on political desires, not economic or environmental studies. Stating that over 90 percent of the water could be diverted with little or no impact was a political one. I had been to Trinity County library, they have three shelves, I researched it. You cannot find anything that states why they decided on 10 percent water flow would remain in the

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river. To me, my conclusion is that it was a political decision, not an economic decision to build the dams.

I'm also concerned with the pumping of Trinity River water into the Sacramento River. This appears to be not necessarily a true watershed. If Trinity County were a state and San Joaquin was a state, this would never happen. They would have never diverted that water into the Sacramento River.

In summary, to me the logical alternative is maximum flow, Number 1. I think let water flow and mother nature rehabilitate the river bed. I have concerns that cubic feet per second is not the right metric to evaluate when the river is being rehabilitated. In Montana, Idaho they use native fish per mile would be a better metric. We need to establish what is the baseline for native fish per mile for salmon, steelhead and trout. At best cubic feet per second and downstream water temperature are only secondary metrics. They could be agreed upon, but unless the limits are set, we still may not be able to rehabilitate the river or the fishery. The flow evaluation alternative is best a poor compromise, and I believe that's Alternative 2, and it presents unacceptable risk. 48 percent of the runoff prescribed in the alternative may not be enough to restore the

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fishery. It may require as much as 70 percent of the flow. I have great concern with the in-channel mechanical restorations as they are not a proven concept. At best they're experiments without baselines to validate if they are even effective. I looked at the University of Washington's fishery library, I surfed the Internet and I can't find any data to support why we would want to do this mechanical restoration, and again, funding for these mechanical restoration projects is unreliable.

In summary, the answer is simple, more water for the Trinity. Maximum flow is the best alternative. Thank you.

HEARING OFFICER RUESINK: Thank you, Mr. Frogner. Our next speaker is Marilynne Chabino.

MS. CHABINO: Hi. I'm Marilynne Chabino, M-A-R-I-L-Y-N-N-E C-H-A-B-I-N-O. I'm here tonight to speak for the many friends, family that I have on the Trinity River and Humboldt County. I spoke with several people today in Burnt Ranch and along the Del Loma River all the way up to Willow Creek and hoping that I would come tonight to speak.

I have had a family home in Burnt Ranch since -- well, I'm 55, so I've been going up there ever since I was five years old. What I want to make people realize,

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I have seen the changes that have become because of the dams that were built. I can remember when they were getting ready to build Whiskeytown and what it did to the lakes, the rivers up there.

I caught my first fish when I was seven years old at Cedar Flat, that was salmon. I could remember when the salmon flowed unbelievably thick along the Trinity River. They had ropes out strung with salmon, they had row houses, everything was going very well in Trinity County and for Humboldt because the people there respect the river. What has happened here is that our government has failed the people, the people in the Trinity and Humboldt Counties by letting them down, by taking away the river, a free river, which many do not exist anymore. What I have seen is you can walk now three quarters of the way out into the river in the summer. Fish can't live there. Wildlife can't live there. What we have done is damaged everything along that highway, and we have done damage to the people. They have been deceited, they need help. The water needs to flow again and become a free river. This is to bring back wildlife, many, many wildlife. I can remember otters playing in the river, all kinds of wildlife, and now you've destroyed that, just like you've destroyed much of the United States in their land

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and rivers. The Sacramento River does not have to have that water. Perhaps if you did not divert the water to the Sacramento River, we wouldn't have worries about floods; would we? So that's something to think about.

Remember, you have destroyed what was once very beautiful and very wild. The people in Trinity County have a great love for their community. They have been devastated by everything the United States Government has done. The Hoopa Indians have been effected, all the people along the river. It has taken away their livelihood and the government is not taking care of we, the people. Thank you.

HEARING OFFICER RUESINK: Thank you for your comments.

The next speaker is Darius Pazirandeh.

MR. PAZIRANDEH: Hi. It's D-A-R-I-U-S P-A-Z-I-R-A-N-D-E-H. I'm from UC Davis. I represent the UC Davis Green Party and the UC Davis Student Environmental Resource Center, and basically I've had explained to me that the 48 percent plan would only keep the fish and wildlife healthy if we were to go in with bulldozers every year and repave the riverbed into a natural setting which seems kind of sort of a paradox to me to go in and make a natural riverbed with bulldozers. That would not take care of the lack of gravel and

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sediment flow that would be coming down. So there is a lot of problems still even with that proposal.

I find only having 48 percent is unacceptable. Nature is complex, and we can't just go in with the bulldozer and replicate salmon spawning beds and all the other like complex things that happen naturally when you go in -- when the water flows at its full rate. You can do a model and you could test and see, well, it will -- the water, when we have it paved this way, will do this specific thing that we've tested our model on, but there's going to be hundreds and hundreds of other things that we are not going to be able to account for. So there's going to be some kind of, you know, just random stuff that comes up, and it's not going to be an acceptable for the healthy wildlife.

The Trinity River Act of 1955 mandates that the wildlife be healthy above everything else, that's what the law says. If the wildlife isn't healthy, then we need to do whatever we can to make it healthy, and we know that the more water that's released into the river from the dam, the healthier it will be, but the bulldozer method, it's at best very expensive. I've heard anywhere from two to $5 million a year, and it's unreliable. And I mean, how could we even be sure that the funding to keep going in there every year will be --

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will always be there? What if in five years they decided, "Okay, well, we don't want to do that anymore, we need to make a budget cut, lower taxes," then you could only have this little amount of water coming through and there's not even going to be people going in there trying to make that effort. I think we need to have at least 70 percent of the water going through. Thank you.

HEARING OFFICER RUESINK: Thank you. Our next speaker is Aaron King.

MR. KING: Hello. It's Aaron King. A-A-R-O-N K-I-N-G. I grew up on the Trinity River in the watershed, and I spent a lot of my formative years fishing and floating and playing and experiencing that river. When I was about 14 or so I found out that that river was somewhere around 10 or 15, maybe a little more, percent of its actual size. When I found that out I was amazed and I was disgusted. I was disgusted because it struck me that a bunch of presumably men, sorry, that's the position we are in, had got together and decided that they could -- they had the right to take that water from the land, from the plants and animals and people who live there and take it somewhere else for other purposes, to sell, to make money on alfalfa so they could grow cows, that's presumably

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what's going on. That's not acceptable to me. It's not acceptable to anybody that I've ever talked to in Trinity County. We all agree on this. I mean, there's a few people probably who don't, but just everybody that I've ever talked to in Trinity County agrees that this water belongs in our county, belongs in our river, belongs in the Klamath, it belongs to the salmon. There shouldn't need to be any other discussion. However, we have a law that says that you have to protect the wildlife and the fish, and we are still not doing it. Now we have this Environmental Impact Statement, and it's saying that the preferred alternative is, again, not to successfully protect the wildlife. When are we going to just -- when are we going to just give up on trying to deceive ourselves? When are we going to give up on trying to make a fast buck on our natural resources? This is our inheritance to our children. It's my inheritance. We have no right to destroy this river. The mechanical restoration, it's never been shown to be effective. Everybody who looks into this, it's one of the things that they find out. You can't -- as Darius says, you can't restore a river by adding a bunch of gravel. How is it going to deal with all the silt and the muck that that stirs up? It's just going to compound the problem. I've heard of many attempts of

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mechanical restoration, they never work. The fact that the preferred alternative includes mechanical restoration shows that the writers of the Environmental Impact Statement, writers of the preferred alternative themselves know that 48 percent of the water is not enough to do the job. Are we going to do the job or are we going to not do the job, almost used the wrong sort of vernacular there.

We have a choice here as American citizens to protect our land or not, and I ask that you and the Secretary make the right choice here and allow all of the water down the river. I heard it said by people whose opinions I trust that 70 percent is enough. It strikes me as an individual and as a person personally that all the water should go down the river. It's not even that significant of a loss to the Central Valley project. It should all go down the river, but if 70 percent will actually restore the fisheries without the need for mechanical restoration, then that's fine. There's no reason why we shouldn't do that. That's all I have to say. Thank you.

HEARING OFFICER RUESINK: Thank you. Forrest Cross, would you come to the microphone, please.

MR. CROSS: Hello. My name is Forrest Cross. F-O-R-R-E-S-T C-R-O-S-S. I am born and raised

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in Trinity County. Douglas City, in fact. I grew up on the hillside overlooking the Trinity River. I saw it as a part of my life everyday for about 18 years, and I'm a student now here down here at UC Davis studying engineering and geology, and in my studies I do a lot of hydrology and kind of geomorphology through the geology and engineering departments, and I wanted to address you guys about the alternative, the preferred alternative that you guys have heard that's written up in the report. I do not think the preferred alternative is acceptable. The amount of water that is allotted to be released into the river is only 40 something percent, 48 percent or something like that, and I don't feel that that's going to be enough to restore the river to its natural -- it's pre-dammed state, and in the 1955 Trinity River Dam Act and in the statement on why the report was done, it's to restore the anogomous fish population to pre-dam levels. The best way I see to do it is the maximum flow, release all the water that you can down the river. In fact, the two most important criteria that these flows studies were based on, the fisheries' resources and the vegetation wildlife and wetlands, the maximum flow alternative was by far and above the best alternative. And as I stated before, the goal of -- the goal of the report and one of the things

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that was stated in the report or the Dam Act or the Trinity Dam Act of '55 is that the fisheries should not be hurt in any anyway whatsoever, they should be at pre-dam levels. The only way it's going to happen is the maximum flow. The pre-dam alternative also includes mechanical restoration. I don't feel that mechanical restoration is the proper way to go about it because that's not a natural way of restoring your natural fisheries. You are going in there with bulldozers and excavators and other heavy equipment and messing with the ecosystems yet again. I have an example of mechanical restoration that has failed right below my house down by Steiner Flat along the Trinity River. There was a side channel put in, thousands of dollars were spent on it and a lot of sediment was stirred up and sent down the river all this kind of stuff and to no avail whatsoever. The side channel doesn't even -- water doesn't even flow down. I don't feel that mechanical restoration will be able -- it's not even a good option to try to restore the fisheries. The funding for it is also as stated by a speaker, somebody earlier, is kind of in limbo. It's got to come out every year, it's not going to be there necessarily. If you let the water do its thing, if you let all the water that comes into the river flow back down the river, it's

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the best cure. it will be the best cure.

In the courses that I've taken in my studies here at UC Davis, water is the best cure. Mechanical restoration doesn't always work. I've seen several examples in classes that I've taken, and I would really like to be able to some day go down to the Trinity River and be able to catch a salmon in the river because I grew up on the river, fishing in the river. I have never caught a salmon. I have caught a handful of steelhead that I could probably count on one hand. They're just not there. It's definitely not the pre-dam levels whatsoever, and I think the maximum flow is the option that should be considered.

HEARING OFFICER RUESINK: Thank you. Steve Evans.

MR. EVANS: Good evening. My name is Steve Evans. That's E-V-A-N-S. I'm the Conservation Director of Friends of the River, not to be confused with Friends of the Trinity River, our sister organization. Friends of the River is a statewide river conservation group. We have nearly 8,000 members dedicated to the protection and restoration of California's free-flowing rivers and watersheds.

Restoration for the Trinity River is a high priority with us. I think its restoration is a fact of

law, it's mandated by existing law. As you all know. The Trinity River Act of 1955 required that no harm come to the Trinity River fisheries and obviously that hasn't come true and needs to be rectified.

Also, clearly there are trust responsibilities of the Federal Government to the downstream Native American tribes. The damming and diversion of the Trinity River greatly effected their livelihood, and it also largely destroyed the recreation-based industry of Trinity County and for what? The Trinity project was a vast transfer of natural resource wealth from Trinity County to a desert area of Southern San Joaquin Valley, the Westlands Water District. Not only has that transfer of vast wealth effected Trinity County adversely, it's effected San Joaquin Valley adversely in terms of environment. The miles and miles of cotton fields and other agricultural uses that Trinity water made a reality in the San Joaquin Valley greatly impacted the natural environment of the San Joaquin. A whole host of rare and endangered wildlife and plant species are the result. Toxic selenium, agricultural drainage draining northwards to the Sacramento/San Joaquin/Delta are the result, and so fixing the problem in the Trinity River is also going to help the environment in the San Joaquin.

I think we need to consider that wealth transfer that occurred with the Trinity project a loan and the loan has now become due and payable. I understand that means economic hardship for agricultural interests in the Westlands Water District, but this water wasn't their's to use permanently, and now the fish in the Trinity River and the people in the Trinity watershed need it. For that reason Friends of the River strongly supports an increase of flows up to 70 percent to restore the ecological balance of the Trinity River and the fisheries of the Trinity River and the social uses based on those.

We don't believe that the preferred alternative at this point of less than 50 percent flow restoration will do the trick. Several speakers before me had talked about the uncertainty of mechanical restoration. I have to remind you all that -- well, perhaps a quote is best. Reed Noss, a conservation biologist, stated that not only is the ecosystem more complex than we think, it's more complex than we can think.

We don't have all the answers, simply thinking we could run bulldozers down the river to restore the fishery of the Trinity River is hubris.

I'd like to remind you of one example in the Trinity watershed, Grass Valley Creek, big erosion

problem at Grass Valley Creek, big sedimentation impacts on the Trinity River fishery. The solution was to build a sediment dam. That dam is now almost full of sediment, sediment remains the prolem. Instead of building the dam, we should have simply purchased the watershed a long time ago, which we eventually did a few years ago, but a long time ago to prevent the road building and logging on the highly erosive granitic soils in that unstable watershed, but instead we took the hard solution, we took the technical solution of building another dam. It didn't work. Let's not rely on more mechanical technical solutions. Ecosystems need water to function. The basic need for the restoration of the Trinity River is more water.

There is one additional legal mandate I think you should consider in this program of why you need to put as much water back into the river as possible, that is the National Wild and Scenic Rivers Act. The Trinity River was designated a state wild and scenic river in 1972. It was subsequently added to the National Wild and Scenic River system in 1981. As a national wild and scenic river, federal agencies have this responsibility, this is a direct quote from the Section 10A of the National Wild and Scenic Rivers Act, "Each component of the National Wild and Scenic River System shall be

administered in such a manner as to protect and enhance the values which cause it to be included in the system."

The outstanding value that caused the Trinity River to be added to the federal system is its anogomous fishery, its salmon and steelhead fishery.

So you have a proactive responsibility under the National Wild and Scenic Rivers Act, as well as the Trinity River Act of 1955 and the Federal Government's trust, responsibilities to Native Americans to restore the river. Thank you.

HEARING OFFICER RUESINK: Thank you for your comments, Mr. Evans. Brian Jobson.

MR. JOBSON: My name is Brian Jobson. J-O-B-S-O-N. I represent the Sacramento Municipal Utility District.

SMUD is the largest power customer of the Central Valley Project. The hydroelectricity that we buy from the Central Valley Project allows us to serve our load like the load that's lighting this room tonight in an environmentally sound way from the perspective that it does not create air pollution, and the preferred alternative will reduce the amount of hydroelectronic generation on the Central Valley Project and impair our ability to meet some of our environmental objectives.

Having said that, the District supports

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restoration of the Trinity River, but we have worked hard to see that it's done in a way that's most environmentally responsible and results is not -- does not -- excuse me, does not result in necessary adverse impacts on other parts of the environment besides the Trinity River. I'll go through now what I think the shortcomings of the environmental document are, and I would request that they all be addressed in the Revised Final Environmental Impact Statement Report.

First of all, the scientific evaluation of factors limiting fishery production in the Trinity River is lacking. Rather, the problem is simplistically attributed to flow reductions without a comprehensive analysis of the role of harvest or hatchery impacts, both of which are recognized as important and having undergone recent changes.

Second, little effort has been made to reduce flow needs by relying on mechanical measures which have been demonstrated to be successful in other streams, both in California and throughout the West in efforts conducted by the Department of the Interior. Literature in the scientific community has documented the capability of mechanical measures to achieve restoration goals while limiting the need for additional flows. We feel a more balanced alternative in this vein is needed.

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Thirdly, we believe the alternative ranking system in the environmental document is contrived and biased towards selecting the preferred alternative because it does not select an alternative based on fishery production, but rather on simulating a natural river with the untested assumption that if you build such a river, the fish will come.

There are many human needs of this river now, and like it your not, that's where we are. There is a lot of power generation and irrigation depending on this water, and to the extent we could accomplish fishery restoration with less adverse impacts on other Central Valley Project purposes, we feel that would be a better alternative and one that should be evaluated.

Fourth, we believe the impacts on the Sacramento River and Delta fisheries are not adequately evaluated. They do not appear to take into account the AFRP flows mandated by the CVP Improvement Act. They allow X-2 violations in the Delta which are not allowed to other entities proposing actions, and they rationalize impacts to endangered species based on the assumption that they are small compared to the no-action alternative.

Fifth, the no-action alternative assumes that there will be degradation over the period of evaluation. We have a problem with that assumption because we are

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participating in many improvements to the Central Valley Fishery under the CVP Improvement Act and we feel that there will be improvements over time, not degradation in the Central Valley, and secondly, the impacts of the proposed action in the Trinity on the Central Valley Project should be additive to the no-action alternative, not compared and rationalized away as being small.

Sixth, the impacts on power generation are severely underestimated. They ignore the impacts to CVP power users which will accrue from incurring additional O and M expenses to accomplishing channel modifications. There is also an ignoring of the impacts to CVP power users, increased under CVP that will result from the decrease in water sales if the proposed action as implemented.

We ask that the power impact analysis be redone in the final environmental document to address these impacts and that mitigation measures are included that will help the power users be able to support the proposed action as we've ask this be modified. This mitigation may include adopting a non-reimbursable designation for increased O and M expenses or adopting non-reimbursable replacement power funding as was done in the Temperature Control Device at Shasta Dam.

The cumulative impacts to power also need to be

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revised to accurately include impacts from Central Valley Project improvement restoration funding and operational impacts and CALFED impacts. We would ask that the Interior revise the final environmental document to include the mitigation and the additional alternatives that we've asked for, provide better support for the recommendations that are made and if it's done, we'll find this to be a legally sufficient document. Thank you for the opportunity to comment.

HEARING OFFICER RUESINK: Thank you, Mr. Jobson, for those comments.

Our next speaker is Ben Letton.

MR. LETTON: Hi, my name is Ben Letton. I have been a resident of Trinity County for 23 years. I'm 23 years old and actually grew up about quarter of a mile from the river, and I share a lot of fond memories of the river with a lot of people. I've watched the river go from quite a good fisheries resource to something that's a little bit subpar. I could remember my dad and I went fishing as a kid and catching a few salmon in like an hour. And then where like you go out today you could spend a couple days and maybe not catch anything.

I think the issue for someone like myself, a resident, is to see the river restored, and it's not

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just an issue of the fish, but all the wildlife and the river as a resource for this state and everyone who lives here.

I think that the resource will become -- it's just as important as a resource as the state is for agriculture, especially in the future. There's been a lot of talk about, "Well, you could fix the river by creating habitat, you could make a catchman and maybe fish will use it for a natural spawning ground," that type of thing, but if you read the literature, especially the literature of late, you will find that for most -- for water systems in general, the best solution is water and to leave the system, step away, let more water come in and you will see results. You can't fix a non-linear system with linear measurements. This length of a channel that the salmon could use will help us restore this many salmon. It just doesn't work that way. It's a wild system and water is the way that it was created and water is the way that it will be fixed, and as a resident, I hope that I could take my children back there when I'm older and show them the things that my dad showed me, and I think everyone would like to see that. Thank you.

HEARING OFFICER RUESINK: Thank you. Next speaker is Vince Wolfe.

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MR. WOLFE: Hi. I'm Vince Wolfe, that's spelled V-I-N-C-E W-O-L-F-E. I'd like to start just by I don't know if anybody here has heard of Jeff Mount, but he is a professor at UC Davis, spoken before Congress about river, issues about rivers all over the country, mostly in California, and I took a class from him actually at UC Davis and this is his book. In one area of his book he just addresses specifically the Trinity River. He says, and I'm quoting here, "The impact of the export of this water has been the virtual elimination of floods." You probably all know this and might perceive it as a good thing, but actually, because of the decrease in water flow, you have -- you don't flush out the rough sediment that's needed for salmon habitat, for salmon spawning habitat, as he says, "Although still present the gravels that would normally make up the key spawning habitats have been buried by the fine sediments that have filled the aggraded channels. Lack of flushing flows competent to remove the fine sediment has inhibited the exhumation of the gravels."

So, in other words, the silt is over the critical spawning habitat keeping the salmon from being able to hatch there.

So as Ben said, more water is really the only

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answer in terms of flushing out the fine sediment that's keeping the habitat from being high quality, and the other issue is when -- there is a picture of this, with your permission, could I show you this picture -- of before and after, a photo of when the dam was created just as a reference to see what happens to the channels when there's less water and more water: could I show you?

What's happening in that picture is that the riparian area is encroaching on the channel where there used to be a very wide -- I shouldn't say "very wide," but a much wider flood plain where there could be wetland habitat. When the river is shrunken because there's not enough water consistently going down, the riparian, which is very aggressive, will come out and grow on the channels and stabilize them. At that point when you do let out more water, and I think in each of these alternatives they let out water for five days in May, when you do release large amounts of water, instead of scouring the banks, as a normal, healthy river should, it scours down. When that happens you get sort of more like a cliff-like structure which prevents -- there's no more flood plains for wetland species, and I think this report actually mentions that, and there's some decrease in the species of wetland dependent

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animals, the yellow legged friar I think is one of they.

Again, the only way to solve that problem is to have hopefully a release program that follows the patterns of supposedly natural flows and also just to have more water. So the alternative that's preferred right now I think calls for about a doubling of the current amount of water that's coming out, and I would just call to double that again.

Also, another thing, this will be the last thing. Jeff Mount said numerous times during the classes and I've heard it from many people, you cannot restore a river. And so all of these alternatives call for some kind of manual mechanical restoration, bringing gravel from other areas, presumably from the Trinity River area, but still from other areas, and using it to create habitat, but this just basically has never worked. Never will work. It's a good way of helping out, but it's not going to solve the problem. Only way to solve the problem is to let more water out and let the river do what it sort of does on its own and hopefully eventually get rid of the dam, but that's another issue. Thank you.

HEARING OFFICER RUESINK: Thank you. Just wanted to make sure that we had the proper citation for the text that he was quoting from.

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Our next speaker is Dan Buckley.

MR. BUCKLEY: Hi, my name is Dan Buckley, I just got here, so I assume I was supposed to identify myself as anything in particular.

HEARING OFFICER RUESINK: Yes. Mr. Buckley, if you would state your name, spell it for the record, and please address your comments to the agency representatives at the front table here. This is an informal hearing. We will not have questions or comments back and forth from the audience.

MR. BUCKLEY: My name is Dan Buckley. It's B-U-C-K-L-E-Y. One thing I'd like to say is that one thing for sure that will help this river restore its fisheries, its wildlife habitat is more water. Nothing else is for sure.

Any kind of habitat restoration, channel morphology or any of those kind of things is uncertain. To paraphrase people like Abby, Brower, Muir, Forman, technology is not the answer, natural systems approximating natural systems is the answer.

We need to restore our fisheries, a wildlife habitat, riparian habitat everywhere, and we need to start here with the Trinity. This needs to be a model for every place in the country, starting with California.

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One of the things I'd like to mention is that the Klamath is nothing but the major river here, and the Trinity is a major tributary of the Klamath. We could help restore the fisheries, the habitat on two of these rivers. Why, because the Trinity is a clear water tributary of the Klamath. We could help restore the fisheries on the lower Klamath and the main Trinity.

I can't say that I'm totally prepared here. I'll just sort of throw it out here, but in 1955 when the legislation was passed, in 1963 when the projects were done, we were told this wasn't going to harm our fisheries. We were stupid. Of course we were stupid, but the government led us to be stupid. One of the things that -- maybe the greed for three-year construction jobs made us be stupid. To paraphrase, we get the government we deserve, but now we are a little smarter, hopefully we are not a little bit too late.

In the mid '70s I went and fished the Trinity, took a little 12 foot raft, floated down the river with my girlfriend and my dog. I remember catching four very large steelhead in 20 minutes and saying to myself, "This is too easy."

Well, guess what, it's not too easy anymore. Although I practiced catch and release for 25 years and never fished for subsistence, I respect the rights of

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and culture to do so, ie, fish for subsistence. Past and current legislation give priority to maintain and protect the fish and wildlife, those priorities need to be respected.

For over 30 years we've been operating on a 70 and 30 percent ratio. Now it's time to reverse that ratio for at least 36 years. We need to give 70 percent of the water back to the river, not 30 percent. That may be the only solution. As to the CALFED process we can't restore the Trinity River, we can't trust the government to restore any of the other rivers that they promised to do so.

I myself am in a white water rafting business. I could give a hoot. The people in my business, the people in other business, the fisheries, we need to restore all those species that respect our lives and we respect theirs because guess what, we have a brain, we could use it. It doesn't mean other species can or can in the same way that we do. What I'm trying to say is what happens to those species will happen to us eventually. It's just a matter of putting it off and putting it off in time.

In the CVPIA 1992 legislation 800,000 acre feet was supposed to go back to the fisheries. Well, guess what, at least half of that should come from the

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Trinity, why, because way more than half of it has been coming from the Trinity. So at least 400,000 acre feet should go back to the Trinity River, of that 800 thousand CVPIA promised us.

I must admit, I sort throw this stuff down as I think, as I come about here. One of the things I think about here is about the normal morphology of these rivers. Nature's way of creating a healthy environmental system is the best way, and the only answer here as far as I could determine is to err on the side of caution, give us more water instead of less and maybe the water could create a healthy river system again. Thank you.

HEARING OFFICER RUESINK: Thank you, Mr. Buckley. Mike Belchik.

MR. BELCHIK: Good evening. My name is Mike Belchik, that's M-I-K-E B-E-L-C-H-I-K. I work for the Yurok tribe, Y-U-R-O-K. The Yurok tribe has participated as a cooperating agency, so I won't tell you the point of view of the tribe again, a lot of that is already in the document itself. I do want to go on the record as stating a couple things.

The Yurok tribe is opposed to any extensions of comment deadlines or extending the process. This process has been going on -- the flow study is somewhere

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in the range of 13 to 15 years old. The EIS is already many years overdue. The river just can't wait a number of years while the process gets dragged out. We also oppose any attempts to tie this process to CALFED process. We think that the restoration of the Trinity is a stand alone.

We also -- another point I'd like to make is that we feel that it's imperative that there be funding to actually implement the alternatives, whatever alternative gets to be selected as the preferred alternative. That it's just unconscionable to get to the year of implementation and find out that nobody has planned ahead and that there's not any money right now to implement this and that goes with securing long-term funding for the continued implementation. I said I'd keep it brief, and so I am. Thank you.

HEARING OFFICER RUESINK: Thank you. Dan Ruiz.

MR. RUIZ: Hello, my name is Dan Ruiz, R-U-I-Z. I wasn't going to speak, actually it just dawned on me something that was not being mentioned by anybody. Although I agree very strongly with everything that's been said, especially about the fisheries, one that thing has not been mentioned is the economy of the area. I live here in Sacramento, but I visit at least a

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couple, three times a year, and I've noticed a lot of for sale signs, a lot of closed businesses. It's very depressed up there, the economy is very depressed, and restoring the wildlife and restoring the fishery will not only help the environment, but it will help the economy because people will come. People will come to fish commercially or sport fishing, people will come for rafting, people will come to go hiking, people will come to just enjoy the area. People will patronize businesses, the stores, the restaurants, the gas stations. I think it will help the economy a lot if this river is restored, aside from all the other environmental concerns. Thank you.

HEARING OFFICER RUESINK: That's the end of the cards that I have here, but I understand someone else is signing up to speak right now. Tina Andolina.

MS. ANDOLINA: These things are sometimes tough. Tina Andolina, A-N-D-O-L-I-N-A. I wasn't quite sure if I was going to speak to you guys tonight, so much of what I wanted to say has already been said, and the moral of the story here is the only way to truly restore the fishery in the Trinity River is to give it more water, that's the only thing that we know is going to help.

And I just sort of want to pose a question to you

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guys. It's too bad that you guys can't answer back. What are we really doing here? What's our real goal? Is our goal as stated in the 1984 legislation to restore the Trinity River's fisheries to those levels which existed prior to the dams, or is our goal to sort of make believe that we are doing what we are supposed to do and doing the cheapest possible way and make everybody happy?

The SMUD guy that was talking here earlier said like it or not, we are dependent, basically like it or not, we are dependent on the water. I guess he was trying to tell us that this dam has been here, been producing power, people are making millions in Westlands using this water, take the way it is. Now we need to now mitigate for that. Like it or not no, we don't. The law clearly says that the fish are given priority. That means if you take all the water that the Trinity gives to the CVP and put it back into the Trinity River, then that's what needs to be done. But the preferred alternative is taking the other route. It looks at what's the cheapest way we could do this? What's the way that we could make sure the water people are happy and the power people are happy, when we make this decision, maybe the environmentalist, maybe they'll be quiet, maybe we'll see a 2 percent increase in the

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fisheries and they'll think we're doing okay. When they were talking -- when the SMUD guy earlier was talking about the fisheries, some fisheries in other rivers have been improved with mechanical restoration, yes, maybe they had a one or two or even a 5 percent increase. Were they increased back to what they were before the damn, no. Could you even do that with a dam? I'd like to see it. If you guys can, then you're better engineers than I think. That river and those fish evolve together with 100 percent of the water. So we study for 15 years how much water the fish actually need? No, I think we study 15 years how much we could still divert and maintain some semblance of a healthy fishery. The river needs water, the fish need water, the economies in Trinity County need water. Thank you.

HEARING OFFICER RUESINK: Thank you. Bill Kiene.

MR. KIENE: My name is Bill Kiene, K-I-E-N-E. I'm a native of Sacramento, and I've been in the fishing tackle business for about 35 years in Sacramento, and some points I might make about the river. I think there's been a couple of studies done on the economic value of sport fishing in a couple places in the United States, and that would be a tremendous boom to that part of the county, of the state, but also

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a big selling point of moving here for big corporations like Intel now and Hewlett Packard and stuff is some of the nice outdoor recreation in Northern California that's lacking in other states or lacking in Southern California, so that's one aspect of the restoration of the river.

The other thing is I started selling fishing tackle in the '60s, and a lot of gentlemen that are passed away now related a lot of stories about the Klamath and Trinity River. They talked about the lower Klamath having boats actually tied together all the way across the mouth of the Klamath River. This is hundreds of boats and everybody catching salmon. Then I heard stories from a lot of the old anglers of when they put the dams in, mostly in the early part of this century, how the salmon came in for years against the dams, and basically like on all the rivers in Northern California and pretty much died for like five years, and I guess they just piled up in big rafts on the river, but we have dams in most of our rivers. I always dream about having a few rivers without dams. I do see that nationally and maybe worldwide they're just now as we speak starting to remove a few dams, and I don't think we're talking about maybe removing this dam, but also I think anything they could do to increase the water in

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these rivers would definitely be better.

Again, I had another thought that maybe at an opportune time in the winter time when the flows are excessive, like on the American we had these big flood stages and it did clean the river out very nicely. I don't know if there's any way that they could let the river really go to a really excessive flow and along with a little bit of mechanical, try to blow all that vegetation out of the river. All the willows and everything that are kind of choking the river, keeping the gravel from moving.

The Trinity River is one of my favorite rivers. The last time that we had really good fishing there was 1982. An old friend of mine and I in about early November, it rained pretty heavily and the river came up and an old friend of mine said we ought to run up there because it came up and about then, if it will come up in the fall, get a nice big rain, the steelhead run the river. So we took Joe's trailer up there. In about four days we got 26 steelhead on the flies that were from six to 12 pounds, that's 1982. That's about the last time.

I'm pretty closely -- I worked with Herb Burton up there. He's a local fly shop owner and professional guide, one of the half dozen really good guides in that

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county, and he's eeking out a living on the river, and I'm sure he would have a lot to say if he was here because he's a lot more knowledgeable about the river. He guides on the river full time for like the last 10 or 15 years, so he would be an expert on what's really going on in the river, but anyway, I love to fish the river. We always kind of talk about going up there now and fishing. We don't really usually catch too much.

We have been taking some of our younger fishermen up there to try to bond them with the river and teach them how to fish, how to get into it at access points, but we'll go up there and fish it for three or four days and maybe catch one steelhead in the late fall.

Anyway, if they could bring that river back, I have friends in their 70s and 80s that used to fish the river back before the dams, and that's Colonel Joe Gray, he's retired about 80 now and Wolf Bennet and Joe Patterson, these guys are all about 80 years old. They talk about what the river was like, I guess it was like 50 years ago, and anyway, it would be nice to see it come back just to get better, actually. Thank you.

HEARING OFFICER RUESINK: Thank you for your comments. Eric Gerstung.

MR. GERSTUNG: Thank you. My name is Eric Gerstung, I'm a resident of Sacramento, and I've been

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fishing in the Trinity River since the late 1950s, and I've watched the steelhead runs go down, and particularly interested in the summer steelhead that have gone up the river for many centuries, and I'm very interested in how this project would effect summer steelhead.

The summer steelhead migrate up the river in May and June and require cool water, and the young steelhead go back May into July and require fairly cool water, and when the Trinity River project was first -- the diversion was first put into effect, the runs in the tributaries, particularly the new river in the north fork Trinity dropped down to quite a low level, and then the first increment of increased flows there was a substantial increase in the runs going into the new river in north fork Trinity and this coincided with the increase in flows in the slight increase in the water temperature.

The water temperature is very critical. I believe that if the flow is increased again or doubled, you'd see a great improvement in the summer steelhead runs up the Trinity River. The fish that seem to be most effected are the young steelhead going back to the ocean.

In the Klamath River, the temperatures are two to

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four degrees higher in the mainstem of the Klamath River, and the summer steelhead runs there have progressively declined in the last 10 or 15 years, while the tributary runs to the Trinity River have held their own and somewhat increased. So I think that should be factored into the benefits of the increased flow if you haven't already done so.

I haven't had a chance to study the report yet, but summer steelhead are real special fish, and we are at the southern extremity of their distribution, which occurs from Alaska to Northwestern California, and they're in trouble all throughout their California portion of their range. The figures I've seen, they're only about half as abundant now as they were 10 years ago, and most of the region they occurred in, in the Klamath River tributaries, they've dropped about 80 percent, the mainstem Klamath tributary due to high flows, high water temperatures during this drought period. There doesn't seem to be any recovery in this post-drought period.

I'd like to see also the schedule for improved flows implemented as soon as possible without dragging the decision on and on. I think enough study has been done to make a decision, and I hope the decision will be for substantially increased flows. Thank you.

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HEARING OFFICER RUESINK: Thank you for your comments. Darren Andolina.

MR. ANDOLINA: Hello, my name is Darren Andolina, A-N-D-O-L-I-N-A. Just a couple of quick points. In the 1995 dam authorization legislation they said that only 56 percent of water would be diverted from the river, and I understand that up to 90 percent of the water is diverted at times, and I don't know how that's been gotten away with for so long, even 70 percent is still more than the 56 percent that was authorized, but basically to me that's theft. This water has been stolen, and the power companies and the water district have all built their businesses off of this theft from Trinity County. I think that for them to come crying now and saying that, well, we are going to have to pay for this and that is wrong. If you steal something, you go to jail, you pay for it. Unfortunately it's not that direct by giving the water back, but they still should have to pay for the damage they've done by this theft.

One other point. I was shown or read over the minutes from when they first had the hearings of authorization of the dam in the '50s sometime, and I understand then that the science that they did, they actually had people come up and say that less -- less

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water would actually be better for the fish. I don't know if these people were paid off, I don't know if these people just didn't have a clue in the world what they were saying, but it seems to me they were wrong then, and I think the preferred alternative is wrong now. I think that all you simply need to do, like all the people have said before me, the river needs the water, it needs 100 percent of the water, maybe that's not feasible at the moment, but 70 percent, as much as possible needs to be released down the river, needs to be there now. Thank you.

HEARING OFFICER RUESINK: Thank you. Previous speaker Mr. Pazirandeh has asked for some additional time to make another point. I'll allow Mr. Pazirandeh to come up and give us some additional comments and be watchful of other people that might sign up that wish to speak that have not had a chance, in which case we'd have to limit your time, but go ahead.

MR. PAZIRANDEH: I'll just be a minute. It was basically when Mr. Jobson talked about we would be losing -- it would hurt the power companies to be taking the water out, and I don't know much about power, but something that I know more about is one thing that's grown a lot in the Central Valley is cotton, cotton is a very water-intensive crop. I don't know if the water

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from the Trinity River directly is going to be cotton, but our government outlawed hemp in the '30s. Instead of getting fibers from hemp, which is very -- doesn't take as much water, we have to grow cotton and that takes up a lot of water, so it seems that -- it seems like the government -- we have one the hand one part of our government working to help restore the river, but on the other hand, another part of the government is saying directly, "Well, this crop, there could be a solution to that, these water problems. Well, you can't grow it because it's an evil crop."

I guess my point is if people will say, "Well, this is going to hurt us if we let all this water go back down," and I think that there will become a solution if people have less water, they will start growing a crop that requires less water. I don't think that just because it's going to create a hardship in the immediate future is a reason to destroy the wildlife up there, and so that's all.

I think we just -- there's a lot broader picture that we need to look at. I know that it isn't your arena about the legality of hemp or not, but I just wanted to make a point that there's a lot bigger of a picture that's causing the problem, not just the immediate. "We need the water for this crop right now."

HEARING OFFICER RUESINK: Thank you. Another previous speaker, Aaron King wishes to make some additional comments. Again, the same condition if someone else wants to speak that has not had a chance yet, we'll limit your remarks and give them an opportunity, but go ahead, Mr. King.

MR. KING: I'll be very brief, it's A-A-R-O-N K-I-N-G. I just want to comment that at least so far, it looks like we are at the end of the speakers now, all except for one person have very clearly given you comments asking that you give all or nearly all the water back. I'm pretty sure the Westlands Water District could afford to send people up here. Nobody is here. The public is here, we are speaking. So it's pretty obvious what we are asking you to do. Nobody is dissenting here. Even with the guy from SMUD, it strikes me that his complaint could easily be remedied for less money than it would cost to maintain this mechanical restoration business for 20 years or indefinitely.

Also want to make the point about the recent letter that Jason Peltier wrote to the Secretary Babbitt asking for 90 day extension on this public comment hearing. That's nothing more than blatant attempt to manipulate the political process and that must be

discarded. It's not acceptable to hope for a new administration in November to see if we could stall the whole thing until then and get a new Secretary. It strikes me that that's the tactic that's probably being attempted here. That is disgusting. There must be no extension of this. The 12 year study has already taken 14 years, has already taken several years than it was supposed to, it never was to have taken that long in the first place. I hope that you gentlemen and the other people who make these decisions will make it as quickly as possible and send all the water down the river. Thank you very much.

HEARING OFFICER RUESINK: Thank you. At this time I have no additional requests for people to speak. If anyone in the audience now wishes to make a statement that has not registered, I would ask you to go to the table and fill out a card, and we will give you an opportunity to do so. I don't see anyone moving toward the registration table, so I'd like to go off the record at this time.

We will reconvene if someone else registers to speak, and we'll be here for about another half hour, until 8 o'clock. We are off the record.

(Whereupon, a recess was taken.)

HEARING OFFICER RUESINK: If I could have

your attention for just a minute, please. We are back on the record. I have no additional slips for people to make a statement this evening. We are at the time for scheduled closing of the hearing, and so on behalf of the U.S. Fish and Wildlife Service and the cooperating agencies, we appreciate the time and effort that you took this evening to present your comments. They've been very informative and will be fully considered in reaching a final decision. The hearing is closed. We are off the record.

(Hearing adjourned at 8:02 p.m.)

CERTIFICATE OF REPORTER

I, MARYANN H. VALENOTI, a Registered Professional Reporter and Certified Shorthand Reporter, hereby certify that the testimony in the foregoing proceedings was taken by me, a disinterested person, at the time and place therein stated, and that the testimony was thereafter reduced to typewriting, by computer, under my direction and supervision.

I further certify that I am not of counsel or attorney for either or any of the parties to the said proceedings, nor in any way interested in the event of this cause, and that I am not related to any of the parties thereto.

DATED: DECEMBER 8, 1999

MARYANN VALENOTI, RPR, CSR
CERTIFIED SHORTHAND REPORTER
No. 11266

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U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

PUBLIC HEARING
regarding
ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT
FOR THE TRINITY RIVER MAINSTEM FISHERY RESTORATION

EUREKA INN
518 7th Street
Colonnade Room
Eureka, California

TUESDAY, NOVEMBER 23, 1999

1:00 P.M. and 6:00 P.M.

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APPEARANCES

PRESIDING:

ROBERT G. RUESINK, Supervisor
U.S. Fish and Wildlife Service
Snake River Basin Office
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APPEARING:

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MIKE ORCUTT
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Hoopa, California

TOM STOKELY
CHRIS ERICKSON
County Supervisor
Trinity County
Hayfork, California

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AFTERNOON SESSION 1:00 P.M.

THE HEARING OFFICIAL: We are now on the record.

Good afternoon. On behalf of the United States Fish and Wildlife Service, I welcome you to this public hearing. The U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, Hoopa Valley Tribe and Trinity County are conducting a joint process for taking comments on the draft Environmental Impact Statement/Environmental Impact Report for the Trinity River Mainstem Fishery Restoration.

My name is Robert Ruesink. The last name is R-U-E-S, as in Sierra, I-N-K. I'm the supervisor of the Fish and Wildlife Service Snake River Basin Office in Boise, Idaho, and will be serving as the hearing official for this hearing.

The hearing is scheduled from 1:00 to 3:00 p.m. this afternoon and we will be back here this evening from 6:00 to 8:00 p.m.

With me at the front table are representatives from the Fish and Wildlife Service, Hoopa Valley Tribe, Bureau of Reclamation and Trinity County. You'll hear more from each of them in a minute, and they'll introduce themselves.

Other representatives for the U.S. Fish and

Wildlife Service are also at today's hearing at the registration and information table outside the entrance to this room. They have additional information for you at that table and will be able to answer questions that you might have about the Trinity River restoration project.

At this point I'd like to introduce Bruce Halstead, who is the Fish and Wildlife Service representative today, and he will make an opening statement.

MR. HALSTEAD: Thank you, Bob.

Good afternoon. My name is Bruce Halstead of the Fish and Wildlife Service office in Arcata.

Release of the draft Trinity River Mainstem Fishery Restoration Environmental Impact Statement/ Environmental Impact Report is the latest step in a process that Congress initiated several years ago to address longstanding concerns about the effects of water diversion, instream habitat, sedimentation, and watershed management issues on the Trinity River system's health, including its once-abundant salmon runs.

Congress directed the Secretary of the Interior to evaluate the impacts of these issues and to take steps to restore the health of the Trinity River system. In response to this Congressional mandate, the Department of the Interior has been actively participating in a study for more than 15 years. This has been a collaborative

effort by the U.S. Fish and Wildlife Service, the U.S. Bureau of Reclamation, the Hoopa Valley Tribe, and Trinity County.

The EIS/EIR summarizes the research that has been undertaken over the past several years and identifies for public comment several potential alternatives for restoring the Trinity River system. Impacts considered under National Environmental Policy Act and California Environmental Quality Act are not limited to the impact to the fishery resources of the Trinity River but include all impacts of the actions affecting the human environment. The Department encourages public comments on all aspects of the draft EIS/EIR.

This public hearing is part of a comment process on the draft EIS/EIR. It will be closed December 20, 1999. A record of decision is expected in the early spring of 2000.

On behalf of the U.S. Fish and Wildlife Service, the Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County, I thank you for the effort you have made to attend this meeting and also thank you in advance for your comments.

Now I'd like you to hear some introductory remarks from Tom Stokely, the representative from Trinity County.

MR. STOKELY: Thank you, Bruce.

I'm Tom Stokely. I'm with the Trinity County Planning Department. I've been working with the project team to develop this EIS/EIR for the last five years, and I'd just like to welcome you here and encourage you to submit your oral as well as written comments, either here today or by the deadline on the 20th of December. And also I wanted everyone to know that the Trinity County Board of Supervisors will be holding a public hearing on this same project in Weaverville on December 7th from 7:00 to 9:00 p.m. at the Weaverville library, and I encourage you to come and also attend that hearing and let your feelings about the document and the project be known.

Thank you.

Now I'd like to introduce to you Jasper Hostler of the Hoopa Valley Tribe.

MR. HOSTLER: Yes; I'm here to represent the Hoopa Valley Tribe.

I've been involved since 1990, when, in fact, we were the first ones to start recognizing the reduced flow, and since then we have been -- Hoopa Valley Tribe has been the lead -- one of the lead tribes.

Thank you for being -- attending this meeting.

MR. SMITH: My name is Russell Smith. I am representing the Bureau of Reclamation, Northern California area office, which is located at Shasta Dam.

I have been working to improve the Fish and Wildlife in the Trinity Basin for the past 11 years, and I represented the Bureau of Reclamation in this flow EIS/EIR process.

THE HEARING OFFICIAL: Thank you.

Public comments on these draft EIS/EIR documents will be accepted until December 20th, 1999. After review and consideration of your comments, the four co-lead agencies, along with the cooperating agencies, will prepare a final EIS/EIR. The purpose of this hearing is to receive your comments on the draft documents. Comments on all aspects of the alternatives described in those documents are very important and will be carefully considered. Because of the importance of your comments, it is necessary that we follow certain procedures here this afternoon.

If you wish to present comments at this hearing, please register at the table outside this room. When you register, indicate any organization that you are representing. When you are called to present your comments, please come forward to the microphone in front, begin your presentation by stating your full name, spell it for the record, and indicate if you represent an organization.

This is an informal hearing, and therefore you will not be questioned or cross-examined in connection with

your comments; neither will representatives of the agencies respond to questions. They will become a part of the administrative record on this action. They are being recorded by the reporter to preserve them for the record. Please keep in mind that the reporter will not record any statement from the audience or made to the audience. Comments must be made into the microphone and addressed to the agency representatives at the front table. Please leave a copy of any written material to which you refer with the reporter or the registration staff. If you are reading your testimony, we ask that you please read slowly for the reporter to be able to record all of your comments verbatim.

Instead of presenting oral comments here this afternoon, or, in addition to oral comments, you may submit comments in writing. Written comments may be submitted today to the staff at the registration table or they may be mailed to Mr. Joe Polos. That's P-O-L-O-S. U.S. Fish and Wildlife Service; 1655 Heindon -- that's H-E-I-N-D-O-N -- Road, Arcata, California, 95521. This address is also available at the registration and information tables outside this room. Again, written comments will be accepted through December 20th, 1999. Written comments will be given the same consideration as oral comments that are presented here this afternoon.

At this time we are ready for our first speaker, Mr. Denver Nelson.

Would you come to the microphone, please.

MR. NELSON: My name is Denver Nelson. I'm from Eureka, California.

Do you want me to spell Nelson? N-E-L-S-O-N.

I'm a member of the Humboldt County Fish and Game Commission, but I'm not here officially representing them; I'm just here representing myself.

Thank you for coming to Humboldt County.

As you know, the Trinity River was devastated by the Trinity River diversion project. Many millions of dollars have been spent trying to restore the Trinity River. The Trinity River has not been restored, and, in fact, has continued to decline. Many years of studying the Trinity River has shown that rivers need water to function. No amount of money without water will restore a river. Much emphasis has been given to the decline of salmon and steelhead populations in our area. This decrease is well-documented by many studies and by my personal observations as a sport fisherman.

Fish numbers are certainly one indicator of the health of our river environments. There are many other factors that influence the health and numbers of the salmonid populations. A river is more than a natural fish

hatchery. We must not overemphasize increase in fish numbers as the ultimate goal of restoring the Trinity River. If there are no fish returning to the Trinity River 20 years from now, does that mean that the entire flow of the Trinity River can then be diverted to the Central Valley? I certainly hope not.

The concept of making the Trinity River one-half the river it once was by giving it one-half the natural flow and spending millions to move gravel around is a noble experiment. The outcome of this experiment could be measured by the numbers of fish returning. One could simply assume the goal would be to add one-half of the prediversion fish returned. If three-fourths of the prediversion fish return, does that mean that three-fourths of the predivision flow would be returned? In addition, millions of dollars would have to be spent moving gravel. Or, conversely, if only ten percent of the prediversion fish return, does that mean that ten percent of the natural flow comes down the Trinity River and fish restoration money is sharply cut back?

Between 1976 and 1998, $93,952,547 was spent on Trinity River restoration. During the same time, 648,457 naturally spawning chinook returned to the Trinity River. This amounts to $144.89 being spent per fish. There appears to be no correlation between dollars spent on

restoration and numbers of fish returning to the Trinity River. A much better correlation is seen between river flows and fish returning to the Trinity River. Fish responded better to water than to dollars. It would be better to spend less money on fish restoration and increase the Trinity River flows.

Humboldt County was given 50,000 acre-feet of water annually in the original legislation establishing the Trinity River diversion. This water allocation has never been accounted for, either by increasing the Trinity River flows or by Humboldt County being compensated for our 50,000 acre-feet of water flowing down the Sacramento River. One of the cornerstones of the Cal Fed process is the sale of water by those with excess water to those who need more water. When the final Trinity flow is selected, that flow number should be increased by 50,000 acre-feet, so that we in Humboldt County can use that water to further enhance our fisheries. Conversely, if our 50,000 acre-feet is going down the diversion, we should be compensated for that water by the users of that water.

The Trinity River Dam eliminated 109 miles of steelhead and salmon habitat above the dam. The ideal restoration of this habitat would be to remove the dam. The next best restoration would be to install a fish ladder to bypass the dam. Serious consideration has not

been given to this option. The fish ladder would be a more cost-effective way of restoring fish habitat.

My preferred flow alternative would be the restoration of the natural Trinity River flows and diverting no more water to the Central Valley. My next best flow would be that promised in the original legislation. The promised diversion originally was to be no more than 30 percent of the Trinity River flow. The preferred flow as outlined in this EIS/EIR would be my third choice. The other study flows are inadequate.

No matter which flow is chosen, funding must be available for the bridge and structural removals needed to allow these increased flows. "Adaptive management" is the new buzz word of resource management. In this project, adaptive management should be the prime governing force. If a funded project does not increase the fish returns, the project should not be funded again. If a water flow pattern does not result in increased fish returns, the flow should be changed. At a minimum, the outline of this adaptive management should be in place before any other changes are done.

Thank you for coming and listening to my comments.

THE HEARING OFFICIAL: Thank you, Mr. Nelson, for your comments.

Our next speaker is Mr. Tim Broadman.

MR. BROADMAN: Good afternoon. Thank you for letting me come and speak.

I have two very strong --

THE HEARING OFFICIAL: Excuse me. Would you please state your name and spell it for the record.

MR. BROADMAN: All right. Tom Broadman, spelled B-R-O-A-D-M-A-N. And I reside in Fieldbrook, California.

I just want to remind the panel and the government that we have two very strong legal arguments to restore flows to the Trinity River. One is the Endangered Species Act, and also under the Endangered Species Act, treaty rights, treaty rights to our tribes.

Signed in June 5th of '97 by secretarial order, issued by the Secretary of the Interior and the Secretary of Commerce, pursuant to the Endangered Species Act of 1973, it acknowledged the trust, responsibility and treaty obligations of the U.S. Departments will carry out the responsibilities, "departments" meaning commerce and interior. Under the act, in a manner that harmonizes the federal trust responsibility to tribes, strive to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species.

In 1991, 75 percent of Trinity water went south. Since the diversion began, 96 percent of coho have been eliminated. In May of 1997 the Southern California --

Southern Oregon and Northern California ESU for coho salmon was listed as threatened. Now, recently, affecting this listing under the Endangered Species Act, November 8th of this year, in the Federal Register harm was defined, harm under the Endangered Species act, and harm is defined as any act which actually kills or injures fish or wildlife, and emphasizes that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife. Those essential behavior patterns are defined by National Marine Fisheries as breeding, spawning, rearing, migrating, feeding or sheltering. I think it's pertinent that you restore the runs so these listed fish that are 96 percent gone will have some of a chance to return.

Thank you very much for your time.

THE HEARING OFFICIAL: Thank you.

Our next speaker is Lawrence Lazio.

MR. LAZIO: Thank you. My name is Lawrence Lazio, L-A-Z-I-O. I'm a past president of the Humboldt Bay Fisheries Association and a past president of the California Seafood Institute, a statewide organization representing the seafood-processing industry in the State of California.

Before I get into the area that I have concern

with, specifically, under "alternatives" but eliminated, in talking about increased hatchery production, I want to tell you a story.

In 1975, I heard that the Japanese federal government had a fantastic enhancement program going on in their salmon fishery on island of Hokkaido. If you take the island of Hokkaido and you lay down the State of California, it's approximately from Red Bluff north, making an islet out of that. The Japanese federal government instituted a program of 72 facilities. And I'm specifically using the word "facilities" because they are not what we perceive as hatcheries. These facilities are an enhancement to the natural spawning of the salmon specie, and then the immediate release of the swim-up salmon, just after they've come out of the egg-sac stage and are swimming up, if they were in the river, they are -- their success ratio in relationship to the Eel River spawn fish is approximately ten percent for the natural survival of the eggs against 90 percent for the survival in their facilities. I am calling their facilities "nurseries."

Historically, there was a nursery on the Eel River, to my recollection, in a place called Steelhead Creek, whereby the eggs were taken from the fish, they got to the swim-up stage, they were put in containers, milk -- dairy

units, put on horseback and taken to the top of the streams, where they were released into the natural situation for their survival.

I think by not having an idea of a nursery program, not having been looked at when the increased hatchery-production issue is discussed in this document under 2.2.6, is a failure in this document. I think that there are some new attitudes that are coming that are not included in here that could be extremely beneficial to the fast recovery of the system.

We know that we need more water, period. I agree with that. Everyone, I think, in this room, agrees. I would like to see compensation come from the users that got our water. And that's another issue. But going into this area of increased hatchery production and the reasons it has been eliminated from this document does not take into a fact the concept of a nursery program, and I think that all the people involved, all the professionals, need to start taking a look at that issue.

Those of us that are on the river -- and I'm on the river quite often; I was there a week ago Sunday as a fly fisherman -- recognize the predator problem in the Trinity River system, in the Klamath River system. It's a major issue, and I think that the way the predator-control issue has been handled in this program is just we're sticking

our head in the mud. There is a major problem out there; we all know it. And I have heard recently that National Marine Fisheries Service is looking at the predator problem.

Historically -- let me give you a historic view. I've been in the fish business all my life, from the time I was a little boy. My grandfather came to the Eel River in the 1880's and fished salmon commercially on the river and made a living off of it. Historically, when we had a salmon fishing fleet in the ocean, there was a substantial elimination of the seals and sea lions by the commercial fleet. Their used to be 5- to 700 boats fishing out of Eureka during April, May, June and July, and any time the sea lion was attached to that fisherman's lines when he was pulling up a salmon, it probably was eliminated. What's happened since we've had the protection of the marine mammals is we've had a fantastic explosion -- that probably you all know, but I'm just saying it here in public -- fantastic explosion of the predator population, yet we've had a fantastic reduction in the salmon species. So how can the government allow, on one hand, the predators to go wild and crazy -- and there's pictures circulated around Humboldt County that were taken from the air at the mouth of the Klamath River, and if you try to estimate, there looks to be maybe 2,000 to 2500 sea lions

that are in that grouping of -- in the picture.

So I think that this particular area that I'm talking about, the involvement of a -- I'm going to call it a "nursery program" -- should be looked at for the increased production, because if you take the eggs and you give them a faster start but you put them right back into the river, especially the upper reaches, in my view, you have a natural fish; you don't have what's being perceived as a hatchery fish.

Thank you very much.

THE HEARING OFFICIAL: Thank you for your comments, Mr. Lazio.

Our next speaker is Mr. Tom Weseloh.

MR. WESELOH: Good afternoon. Thanks for coming to Eureka. My name is Tom Weseloh, W-E-S-E-L-O-H. I'm the North Coast manager for California Trout. We represent about 5,000 individual members and another 5,000 affiliate club members. I live in Humboldt County and also work here, as well, and have a rather large interest in the Trinity River.

I already had the opportunity to address you in Redding, so I won't be redundant, as much as possible, but I really wanted to speak to a few issues.

One in particular is the time lines for your process. I know that several speakers and a lot of

various constituencies have asked for an extension of this process. Right now you are well within your legal guidelines with both the CEQA and NEPA process. We encourage you to stick to those time lines and to not extend any further the deadlines for comments. The studies have gone on long enough. We have the information in front of us. The people that need to review this information and give you comments have known about this information, have been following the studies, have been following the time lines, have been getting the documents. There is no need for further delay. We need to have you stick to the time lines of CEQA and NEPA and move forward with this. Our fisheries have been injured for long enough. No more delays are acceptable to us. Please close the comment period December 20th.

Another reason that I think the time lines need to be met is it appears to me that the Bureau of Reclamation is still in violation by even operating this project. There is not a Section 7 consultation process finalized. There is not a biological opinion that has been granted by NMFS. And until then, under the Endangered Species Act, it is our opinion that any diversion at all is a violation of the Endangered Species Act, and if the Bureau wants to be in compliance, they'd better come up with a new flow regime in a hurry in order to get in compliance. One of

the ways you get there is by finishing up the CEQA and NEPA process in a timely fashion, getting to a record of decision, and implementing the flows as quick as possible.

Another issue that I haven't heard discussed yet that I would like to bring up is the -- some of the costs associated with the programs. I think there are some things that need to be added to the EIS/EIR in order to address this area. I feel that the final EIS/EIR should exempt Trinity PUD from any costs as a result of low power generation as well as implementation costs for the preferred alternative. The final EIS/EIR and record of decision should also include a plan for reauthorization of equitable cost-sharing provisions of the Trinity River Basin Fish and Wildlife Management Act of 1984, which are now expired. We have a lot of good things we would like to do, but right now there is no current way to fund those activities, and we need to have the money in there to carry out any of the alternatives that you have and to carry out restoration of the basin as a whole.

The preferred alternative includes a watershed-protection component. We support inclusion of that component because it addresses upslope erosion. It's a nonflow component necessary for the restoration of this important fishery and for the river. It is also consistent with the requirements of the President's Forest

Plan under Option 9, which has never been adequately funded in a meaningful manner. And in order to ensure that the promise of restoration isn't unfunded like Option 9, identification of a funding mechanism is necessary in the final EIS/EIR and record of decision. Without adequate funding, the preferred alternative or any other actions you may take will not meet the goals and objectives of meaningful restoration.

So not only do I request that you heed the comments I've provided you in Redding, but also the ones today of sticking to the time lines and dealing with these cost issues and the biological opinion.

If I have forgotten anything in Redding or today, you will be hearing from me again, either verbally or in writing.

Thank you very much for allowing us to provide additional testimony. And I encourage you to listen to all the other good speakers as closely as you did me. Thank you.

THE HEARING OFFICIAL: Thank you.

The next speaker is Carol Krueger.

MS. KRUEGER: My name is Carol Krueger, K-R-U-E-G E R. I'm here as a representative of Six Rivers Paddling Club. And thank you very much for the opportunity to comment on the public draft on the Trinity

River.

As whitewater canoeists, we are going to comment on the recreational uses of the Trinity River. We think the whitewater canoeists were left out of your list on recognized recreational users in tables 3-32 and 3-33. In our opinion, there is a big difference between canoeists and whitewater canoeists in their preferred flow ranges. Whitewater canoeists should be included with kayaking and rafting in their preferred flow ranges.

The habitat in the Trinity River needs improvement, and we're going to support the preferred alternate. Along with the fisheries restoration, we think that the preferred alternative would also improve the whitewater recreational opportunities on the Trinity River. My comments deal primarily with the analysis of whitewater recreation opportunities that are affected by the proposals in EIS/EIR.

As whitewater canoeists, we have three favorite runs on the mainstem of the Trinity River that will be affected by the proposals in the EIR/EIS. These runs are: Pigeon Point, which is from Pigeon Point Campground to Big Flat; Hayden to Cedar, which is Hayden Flat campground down to Cedar Flat Ridge; and Hawkins Bar to Salyer, which is the Hawkins Bar USFS river access, to the public access of the Sharper Slough on Fountain Ranch Road.

Under the international scale of difficulty, Pigeon Point is rated as a Class III, or intermediate; Hayden to Cedar is rated Class II, or advanced beginner; and Hawkins Bar is rated as a Class I-plus, or intermediate beginner.

These runs provide easily accessible whitewater for users at a variety of skill levels, and the first two runs are used extensively by whitewater boaters from Northern and Central California and from Southern Oregon. We believe that the preferred recreational flow range thresholds given in Table 3.32 incorrectly assigned either 200 or 300 cubic feet per second as the lower limit of the preferred flow for whitewater canoeists or kayaking on these runs. At 300 CFS, the whitewater runs on the mainstem of the Trinity are marginally acceptable for whitewater canoeists. At this low flow, navigating around rocks and other obstacles to navigate are exposed or very close to the surface. Some routes to rapids are not available, and shallow reaches of the river do not have enough water to float a boat, such as the rapid on the Hayden/Cedar run, commonly commonly referred to as "Picket Fence." Even at releases of 400 CFS, whitewater canoeists get out to portage this long rapid, as we can't negotiate the tight turns at the very bottom of this drop. Shallow water is more dangerous for whitewater canoeists, as a canoe turns over, the paddler is in danger of getting

trapped under the canoe and getting, quote/unquote, beat up by the rocks.

We feel that the lowest preferred flow for the mainstem Trinity for rafting, kayaking and whitewater canoeing should be noted as at least 450 CFS, rather than 200 to 300 CFS. Three hundred CFS is a minimal flow for the low threshold but is not preferred. Recreational seasons were defined as from Memorial Day to Labor Day as a primary recreational season in the EIS/EIR, and, in our opinion, is not accurate. We think that the whitewater recreational season for the Trinity River can run year-round. Whenever flows are greater than 3000 CFS at the Lewiston Gorge, the majority of whitewater canoeists would choose to go out on other rivers, but we cannot speak for other types of boats, such as the kayaks and rafts, as they are willing to boat higher flows, and canoeists -- than most canoeists are comfortable with.

The analysis should note that constraints in whitewater boating are dependent on boater skill level and difficulty of the whitewater run, and that low flow constrain whitewater recreation to a far greater extent than high flows.

So, in conclusion, we support the proposal to increase flows into the Trinity River for the purpose of restoration of the fishery habitat in the absence of an

alternative that would allow all the inflow into the Trinity River Basin to be trained in the river. The preferred alternative appears to be a minimally acceptable compromise to promote the natural functions and values of the river.

Thank you very much.

THE HEARING OFFICIAL: Thank you.

Marianne DeSobrino.

MS. DeSOBRINO: My name is Marianne DeSobrino. I live in Eureka on the Elk River, and I'm a chair of the Redwood Chapter of the Sierra Club.

And our position on this is that we would like quite a bit more than your preferred alternative. We would like to see no more than 30 percent of the water diverted from the Trinity River, if any water at all needs to be diverted.

I notice in your statement that the preferred alternative, the increase of -- to 11,000 CFS, the latter will be achieved in about 12 percent of the years. I mean, come on. If you're increasing the flow and you're only going to achieve that increased flow in 12 percent of the years, what happens in the other 88 percent of the years? That seems marvelously ineffective to people who care about fish and the ecosystem.

And I'm also sort of dismayed by who would benefit

most from the project: communities and fishing-related industries. You don't say anything about the fish, which we have been cumulatively destroying, nor the ecosystem, which we all recognize needs support to retain its contiguousness and make its contributions to our survival as human beings.

In addition, the most beautiful solution, I believe, to the entire problem with the Trinity River would be the removal of the dams.

Thank you very much.

THE HEARING OFFICIAL: Thank you.

John McKeon. John McKeon, are you here? M-C-K-E-O-N.

UNIDENTIFIED SPEAKER: He's here.

THE HEARING OFFICIAL: We'll go to the next speaker, and if John does come in, we'll give him a chance to speak, as well.

E.B. Duggan.

MR. DUGGAN: Hi, Tom.

Good afternoon, gentlemen. My name is E.B. Duggan, D-U-G-G-A-N. I'm representing the Willow Creek Community Chamber of Commerce, Trinity Fishing, Trinity Downriver Resource, and I'm also a fishing guide.

I live on the river. I'm there every day. I'm on the river, physically on the river, on an average of about

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three days per week, either fishing, looking, checking. I also make a fishing report for our small community that is published in about four different papers.

I have watched over the years our river flows since the dam -- and this is after the dam's been in -- going from 150 CFS to 300 CFS, 400 CFS, and now at 450 CFS. I don't know if you know it or not, but there is a direct correlation in those increases as to the amount of fish that have come in. And I know Jack can attest to it because he hears it and sees it with his people down there, because I have good relations with those people and I know a lot of them and they are my personal friends.

I have not been in here, or been in the valley, for many years, as Jack or many of his friends, but I've been there long enough to know and realize that, in my eight years as a professional guide, the fish need water. About four years ago, if I could have gone to Nike and come up with a -- and devise a method whereby they could have made small tennis shoes that the fish could have -- I could have put on the fish, I could have made a million dollars giving shoes away to the fish so they can go upriver and spawn. This is a fact. In the short distance from Salyer to my house, which is just three miles, when we were flowing 300 cubic feet per second during the summertime, I would have to jump out of my boat on three different

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riffles and push my customers across it. That's how bad it was. And then the same since -- you have to remember that a drift boat only draws three to four inches with four people in it. Now, what are the fishing going to do?

When you take a ten-pound fish that's eight inches across at the belly, you know, it makes it very difficult for them to get upriver. Even as today, I see many spawning beds called "reds" on the river down in Willow Creek area. And they should be all spawning at least up above Cedar Flat. At least that. It's a shame that the people are just now realizing -- and I say the people in charge of the water flow -- that this water flow is imperative to us. For some ungodly reason, October 15th is the magic date they need to take and reduce the water flow. And they go from whatever is being out down to the 300 cubic feet per second, because we have rain. Believe it or not, we're supposed to have rain up here on the North Coast. That is not happening. If you will take and go to the Department of Fish and Game and check the local Fish and Game in this area here, for the last eight years we have not had rain for opening weekend of deer season, which starts in September. So if we're not getting rain in September and October, why do we cut the water off magically at that October 15th date? The fish need it. And for us to drop that water, it makes it drastically

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low.

The water at my house this year dropped down over a foot when they went from 450 down to 300 cubic feet per second. Now that we do have rain and the water's coming up, then there's plenty of room for the fish to come in. But when they started dropping that water, we had fish up around Junction City, in that section in there, that were actually spawning from Douglas City to Junction City, through that area. And when they dropped the water from 450 to 300, we left -- I'm saying "we" -- left many reds high and dry. We're talking thousands upon thousands of naturally spawned fish that died because the water was let go and drained their spawning area. We need a better control of when that water is shut down from the releases of 450, or whatever is to be set, down to the minimum, so that it does not affect the spawning. I've been reading and reading and reading your river recommendations. The ones that come out here I feel are adequate but by far what we need. We need a return of the water as what was originally said.

I have some friends that have lived on this river since 1948, and they fished it; they've been collecting paper -- newspaper clippings, and I have two of these folders that they've been collecting about what was going to happen when the dam was going to be in, how they were

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going to help keep this water flow up, and none of those things that were put in the paper by the state legislators and the federal legislators have come about. In order for us to maintain and keep this fisheries, we do have to have that water. And without it, it's going to be a drastic situation, because we're already starting to lose more and more fishing areas within the State of California. Our logging was taken away from us. We were told look for other means of economic base for our community.

And, Jasper, you know this. You've seen what our town was like. You used to come down and go shopping. Now we have -- we don't even have full stores anymore. We've lost seven major businesses -- seven of them -- that people from Hoopa, Salyer, and Willow Creek all depended upon for necessities within the community. And we don't have them anymore. We have to travel 51 miles one way, 102 miles round trip, to come into Eureka or Arcata to spend our money and get groceries, a major supply of our groceries. That's outrageous. You in the city don't realize that, because you just go down to the local mall and you get all of the needs that you want. We choose to live in this kind of community because it's healthful and it's more relaxing than in the city. But, in the same sense, as the cities grow, the demand for water is going to just go completely out of sight in the next decade.

There is going to be such a demand on water within the next decade, where they're building from Sacramento, even Redding, down south, that water is going to be worth gold. It could actually be an economic base where people could trade in buckets of water rather than in money.

So please, take consideration. We have converted from logging as an economic base to fishing and tourism, and as we lose our water and our fish base, and the restrictions we're receiving from the Department of Fish and Game, it's harder and harder to entice people into our valley, just to come in and see and enjoy the refinements of outdoor living. And that's what the people in the cities are looking for, is outdoor living.

Look at what has happened to Yosemite. You can't even hardly get in there. My wife and I spent our fortieth anniversary, which we got married in Yosemite 40 years ago this last year, and we had to get reservations. In 363 days in advance, we got the last room in the hotel. So if that's the demand for that kind of area, and the demand is going to be put onto our valley and our communities, we need the resources to take care of them and provide for them, and without the water we're not going to have them.

Thank you very much.

THE HEARING OFFICIAL: Thank you.

John McKeon, are you here now?

MR. McKEON: Yes, I am. I'm going to reserve my comments for this evening's session.

THE HEARING OFFICIAL: Thank you.

Troy Fletcher.

MR. FLETCHER: Good afternoon. My name's Troy Fletcher, F-L-E-T-C-H-E-R. I'm the executive director for the Yurok Tribe, and I'm here today with council member Howard McConnell and our fisheries staff representatives, Dave Hillemeier and Michael Belchik.

The Yurok Indian reservation is located on the lower 44 miles of the Klamath/Trinity River, and the Trinity flows through 44 -- approximately 44 miles of our reservation. The Yurok Tribe is the largest harvester of fall chinook of Klamath River origin, period, of any of the user groups. We have an enormous stake in the outcome of this EIS and what the alternative is that will be selected or the particular management options that will be mandated by the Secretary.

We're looking at the restoration of the Trinity River a little different. We, for decades and decades, have been unable to meet what we consider even minimal subsistence levels, much less have any meaningful economic opportunity to take advantage of the fisher resource on the Klamath/Trinity River Basin. The tribe has a

significant cultural, ceremonial, subsistence and economic reliance on Klamath River fish, and that reliance has been relatively unmet because of the poor status of decline in fish populations on these river systems.

In terms of which options or what alternative we support, before I verbalize that I'd like to talk a little bit about what we do, what our position is in terms of the approach to the alternatives.

Number one is there needs to be a long-term approach to the restoration of the Klamath/Trinity River Basin. In the Trinity River EIS, even though it does have a window of decades, and that was one of the confining factors that was looked at in the alternatives, we're not sure that that's totally appropriate and that's going to take us to full restoration like we believe needs to occur. We believe that the "no dam" alternative is a true approach, a true long-term approach, to fully restoring that river, to put it back the way it was and let nature do what it always has done.

In terms of the alternatives, we support as is, we do support the preferred alternative, and we support that because we think that you need to apply the best available science that you have in front of you. That's important. And we think that the various flow-study efforts, the peer review that occurred, and a whole host of agency and

tribal and other involvement is a step to get to that best available science. We do need to support it with a few caveats, however.

Because the Trinity River does not empty into the Pacific Ocean and Weichpec, it runs down the entire of the Klamath River, we believe that the condition of the mainstem Klamath River has a direct and important impact, and many times negative impact, on the survival of the Trinity River fish. Trinity River fish must traverse the Klamath River as they go out to the ocean and as they come back. If you do not take care of the Klamath River, you will not take care of Trinity River fish. The EIS, as it is, recognizes that to a small degree. We believe that that needs to be a little more -- there needs to be more analysis, and there needs to be more emphasis placed on the importance of that segment of river that those fish traverse through. There also needs to be more importance and emphasis placed on the estuary at the mouth of the river. Is that a bottleneck. What are some of the considerations that are negative impacts that are affecting the fish at the mouth of the river. We've heard about sea lion predation, seal predation. That's an easy one. What about the quality of habitat that's available to the fish. What about the -- what about the other things associated with the food web. What about other

factors. We don't know about those. Those need to be looked at. You cannot restore Trinity River fish unless we look at maybe some of those other bottleneck factors.

So it's important that we take a holistic view in looking at the Klamath Basin. And I'm going to say Klamath basin because the Trinity is only a portion of the Klamath Basin. And I'm going to propose that you cannot restore Trinity fish in a piece of the Klamath Basin ecosystem unless you restore the entire Klamath Basin ecosystem. It's one package, and I don't think you can restore a single part of it, and I surely don't think you can restore a single part of the Klamath River Basin by only addressing those instream needs and not looking out to what those fish -- or what those fish have to go through in the mainstem of the Klamath River or at the estuary.

I'd also like to comment on adaptive management planning and the whole process in terms of where do we go from here. That process, as laid out in the EIR, I think is a good workable start. I'd just like to add a few things: that the tribe needs to be included at all levels in that process; that it needs to be driven by sound science; and I do like the idea of a separate, discrete scientific review panel that looks at the merit of projects and helps identify which projects should be done

and which shouldn't be done. I do think that the way the task force and the TCC operate at present lend an atmosphere to -- for fighting and horsetrading, and all that good stuff, over the limited amount of funding we currently have available here.

I'd like to see some type of objective, numerical ranking system when it comes to project proposals and project selection as guided by some type of independent review, scientific review team. I think that would add credibility and credence to the projects that are selected, and it would force the hypothesis-testing type of process as identified in the EIS to be more meaningful and separate the politics from the science. So I do like that portion of it.

The other thing that's going to be necessary is funding. Right now a lot of people will focus on the amount of dollars and the effort that has been placed into the Trinity to date. I do know the task force and the TCC have struggled with priorities in trying to do the right thing, and I think their efforts are commendable, but we have a long ways to go in terms of funding. There's a lot of debate and discussion and haggling and arguing over whether you fund monitoring projects or whether you don't fund monitoring projects. We're a fishing tribe. That information collected by those monitoring projects helps

us manage our fisheries responsibly, it helps us predict how many fish are going to be available for harvest, it helps us account for run size, escapement information and our harvest information, and it's important information and it shouldn't be cast aside. And it's necessary to monitor the success of any restoration projects. There also needs to be adequate funding for upslope restoration projects, too. You can't just throw more water and restore river and walk away. You've got to do other things, and you've got to do what's necessary to keep sediment out of the mainstem river and restore those tributaries where those fish do spawn. So there needs to be sufficient amount of funding devoted to the Trinity River. I was going to say to the restoration program, but it might not be; it may have been in some other form. But to the Trinity River. And there needs to be enough of it. And you need only look at the amounts of fish, the amount of money that we and others have foregone because of our water being diverted elsewhere, and it doesn't seem so much an amount of money when you compare it against that of the lost opportunities, the lost economic opportunities, the failure to meet our subsistence needs for decades and decades. We think it's fair that federal agencies and others step up to the plate and identify and ensure that we have enough money in that program to do

what's necessary.

That concludes my comments. Thanks.

THE HEARING OFFICIAL: Thank you.

Dave Nakamura.

MR. NAKAMURA: Good afternoon. My name is Dave Nakamura. And just by way of starting this, I have a number of hats in this community. I work at the Humboldt State University and work with a lot of the recreation programs there, including fishing, rafting and river kayaking. I'm also an elected official with the City of Blue Lake. I'm a city council member and also presently a member of the Redwood Region Economic Development Commission. And I mention those, not necessarily that these are official positions in any of those organizations, but that kind of my background on how I'm looking at this situation.

I'm here to lend support to increase flows to the Trinity River. I believe that the Trinity River is the absolute lifeblood of that entire region between the mouth of the Klamath River all the way up to the Trinity Alps area. Part of my perspective looking back on this and listening to other people's comments, where I was kind of remembering back to the opposite situation, which was the drought years in the -- I believe it was the early nineties when the Trinity River was extremely, extremely

Jimmy Smith.

MR. SMITH: Thank you.

Jimmy Smith, J-I-M-M-Y S-M-I-T-H. And I want to thank you, too, for being here today.

On behalf of Pacific Coast Federation of Fishermen's Association, I'd just like to state for the record that we have not yet completed what our final request will be concerning the flow regime. I can tell you, however, that the absolute minimum will be the preferred alternative. And I'd also probably like to mention to you that I agree with a lot of the comments that were made here today: Ed Duggan, Troy Fletcher, Denver Nelson. The list goes on. Tom Weseloh. Folks that are very competent and have watched this situation for a number of years.

The one request that I'd like you to hear clearly from me today -- and I want to reiterate that -- clearly -- is that we will not tolerate -- and I'll speak for the fishing industry here -- we will not tolerate the Central Valley Project Water Association's constant delays and implementation of whatever increase in flow that we'll see here in the near future, and we hope that you will join us in that effort.

So thanks very much.

THE HEARING OFFICIAL: Thank you for your comments.

John Stokes.

MR. STOKES: Good afternoon. Thank you for giving me the opportunity to speak to you today. I am an attorney in Arcata.

THE HEARING OFFICIAL: Excuse me, please. State your name and spell it for the record.

MR. STOKES: John Stokes. J-O-H-N S-T-O-K-E-S. I'm a lifelong resident of Humboldt County. Though I was born in Alameda County, my family moved here when I was six months old. I've been fishing the Trinity River for at least 25 years, otherwise recreating on the river during nonfishing times.

With all due respect to Mr. Sherman, I feel that I have a cultural attachment to the Trinity River as well as he does, although perhaps not as lengthy as his family's cultural attachment. I agree with Mr. Sherman. I think that the bottom line here is we're not going to get down to restoring fisheries on the Trinity River until we approximate the natural flows of the Trinity River. And this will not occur unless we substantially exceed the preferred alternative of 52-percent diversion, and more likely will not occur unless these dams are removed so that the natural processes can restore the river.

I am very skeptical about any sort of piecemeal restoration efforts. I'm very skeptical that some sort of

mechanical manipulation of the streambed will result in removing the clogged, extremely clogged, riparian situation along the upper river, which is, as time goes by, gradually going farther and farther downriver. The river is becoming less and less able to clean itself out after each -- during each year, and I don't think that we're going to approximate that until we get close to natural flows and close to natural levels, and I don't see 50 percent doing it.

I think the histories of fisheries restoration has shown that we spend millions, if not billions, of dollars on efforts that have little or no effect on bringing the fisheries back. A good example would be look at the Columbia River Basin. Look at the fact that they have spent billions of dollars trucking fish in barges down through these dams to get them downstream so they can go to the ocean. The net result has been a continued decline of the fisheries.

During my experience in the last 25 years, I have witnessed a continual decline in the fish available or the fisheries on the Trinity River. And I don't say that lightly. During probably between the beginning of September and the middle of November, on the average I am on the river two to three times a week for several hours at a shot, and this has been true over the last 15 or 20

years. In the last few years, the number of fish on the river -- and I'm speaking about steelhead -- is virtually -- there aren't any. They've virtually disappeared. And I don't know whether we can just directly connect this to the dams, but I can't help but feeling that this is a decline that has occurred gradually and persistently ever since those dams were put in. And I don't see how there's any way we're going to reverse that without doing something rather drastic instead of piecemeal.

I thank you for giving me the opportunity to speak.

THE HEARING OFFICIAL: Thank you, Mr. Stokes, for your comments.

We have now heard from everyone that registered to speak. If there's anyone in the audience that would like to make a statement, please go to the registration table to fill out a card.

We're scheduled to go until 3:00 p.m. this afternoon, and we'll keep the hearing here in place, but unless someone else fills out a slip right now, we'll take a break and reconvene when someone does that.

We're now off the record.

(Off the record.)

We're back on the record.

We've not had anyone else sign up to speak, and so I'd like to close the afternoon portion of the hearing

low. I'm sure many of you remember those years. If you looked at the river at that time, during the summer months, boy, the temperature of that water was amazing. I think if you looked at the gravel bars and the situation where, what was happening with the streambeds, you can see what low flows were doing to the river. You could see what low flows were doing to the willow stands along the side of the river. I think increased flows, if you just propose that, are really going to benefit the river both ecologically and economically.

I would like to tag onto a couple of comments that were made by a couple of people earlier. There was a woman from the Six Rivers Canoeing Club. She made a number of comments regarding the river flows and how it affects her constituency, the whitewater canoeists, and I think everything that she said was very, very true in terms of the recreational use of that river. Ed Duggan also made some comments regarding the flows and how -- the fact that when the river flows are essentially turned down on October 15th, what a significant impact that has on recreation as well. I've been up there quite a bit over the last two months doing whitewater rafting trips, doing kayaking trips, and it's really an interesting thing, once the water goes down that drastically, I think both for the economics of the recreation industry up

there, but also just looking at what happens to the river flow and the streambeds.

Lastly, I think that the river flows are absolutely critical for a number of recreation industries up there, including the whitewater rafting industry and the fishing industries.

Thank you.

THE HEARING OFFICIAL: Thank you for your comments. Duane Sherman? Is Duane Sherman here?

We'll set his card aside.

UNIDENTIFIED SPEAKER: Here he comes.

THE HEARING OFFICIAL: Okay. Duane Sherman, would you come up to the microphone, please. You're our next speaker.

MR. SHERMAN: First of all, let me identify that I'm only here on behalf of myself and not as the chairman of the Hoopa Valley Tribe.

[Speaking in foreign language; not reported.]

And what I said, was since time immemorial the Hoopa Tribe has used the Trinity River. It's important to us because it's life-sustaining. It sustains life not only through acorns, through salmon, through deer, but it means a lot more than that to us. In speaking as an individual and knowing that my roots run deep within the Hoopa Valley. For over 10,000 years the Hoopa tribe has

been located there, and my family has originated from there, and when you talk about agreements that were made, treaties that were never ratified, when you talk about the original legislation that was enacted in 1955 that created the dam on the Trinity River, promises have not been kept. Water transportation and water deliveries out of the basin, salmon habitat that has been destroyed or nonexistent anymore, several hundred miles of habitat. I think we need to look at what the real problem is, and the real problem, the bottom line, is the dam, and until the Bureau of Reclamation, until all the associated counties involved, look at the bottom line of actually removing the dam, then the problem will never really be solved.

This document that we're talking about today, that we're discussing today, is the best effort so far. Does it get us there where we need to be? No, it doesn't. But I think if we study it any longer, we'll fail. And by that I mean this is a 12-year process; it's a 14-year process. But when you look at it from the original legislation of 1955, you know it's a 30-or-40-year process. And at some point in time we need to address the real issue and we need to stop studying it and we need to enact on the legislation, the original legislation that said that. Not one delivery out of the basin, not one export would ever occur that would adversely affect those

involved who depend upon that for their very life.

Now, we have a lot of user groups who have come in here today and basically said that it doesn't go far enough, and I agree with that, but they can pick up and go use a different river; they can pick up and go flyfish somewhere else, go kayak somewhere else tomorrow. But I have a cultural, historical tie to that valley, and I will never, ever leave that valley. Like the generations who have come before me, I'll be there. And hopefully in 10,000 years my family will still be there, and hopefully this issue will be no longer.

But I will submit written comments as an individual, not as -- not as the tribal representative, and I would just hope that the record would be open long enough. And I would hope the best science is being used, because I don't think that what we've come to agree upon today isn't going to be a political question where counties, where tribal governments, where state and federal agencies get involved, and it becomes a political question where the best science is not being used or will we actually use what we know is right. And the bottom line is the dam has to go.

Thank you.

THE HEARING OFFICIAL: Thank you for your time, Mr. Sherman.

with a reminder that we will be here again this evening from 6:00 to 8:00 p.m.

I'd like to thank all of you for coming and making statements this afternoon.

The hearing -- or the afternoon portion of the hearing, is hereby closed. We're off the record.

[Afternoon session concluded.]

/ / /

EVENING SESSION 6:00 P.M.

THE HEARING OFFICIAL: We're on the record.

Good evening. On behalf of the United States Fish and Wildlife Service, I welcome you to this public hearing.

The U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, Hoopa Valley Tribe and Trinity County are connecting a joint process for taking comments in the draft Environmental Impact Statement/Environmental Impact Report for the Trinity River Mainstem Fishery Restoration.

My name is Robert Ruesink. The last name is spelled R-U-E-S, as in Sierra, I-N-K. I'm the supervisor of the Snake River Basin Office of the Fish and Wildlife Service in Boise, Idaho, and tonight I'll be serving as the presiding official for this hearing.

We had a hearing this afternoon from 1:00 to 3:00 p.m., and this is the last in the series of the hearings; we're scheduled to go until 8:00 p.m. this evening.

At the table with me are representatives from the Fish and Wildlife Service, Bureau of Reclamation, Hoopa Valley Tribe and Trinity County. You'll been hearing more from these folks in just a minute.

Other representatives of the U.S. Fish and Wildlife

Service are also at the hearing this evening. Many of them are present in the back of the room or outside at the information and the registration table. You will find additional information about Trinity River restoration at that information table, and I'm sure that the staff will be happy to try to answer questions that you may have about that restoration.

At this point I'd like to introduce Bruce Halstead, who will make the official-service presentation.

Bruce.

MR. HALSTEAD: Thank you, Bob.

Good evening. My name is Bruce Halstead. I'm with the U.S. Fish and Wildlife Service in Arcata, California.

Release of the draft Trinity River Mainstem Fishery Restoration EIS/EIR is the latest step in a process that Congress initiated several years to address long-standing concerns about the effects of water diversion, instream habitat, sedimentation, and the watershed management issues on the Trinity River system's health, including its once-abundant salmon runs.

Congress directed the Secretary of the Interior to evaluate the impact of these issues and to take steps to restore the health of the Trinity River system. In response to this Congressional mandate, the Department of the Interior has been actively participating in a study

for more than 15 years. This has been a collaborative effort led by the U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County.

The EIS/EIR summarizes the research that has been undertaken over the past several years and identifies for public comment several potential alternatives for restoring the Trinity River system. Impacts considered under the National Environmental Policy Act and the California Environmental Quality Act are not limited to impacts to the fishery resources of the Trinity River but include all impacts of the action affecting the human environment. The Department encourages public comment on all aspects of the draft EIS/EIR.

The public hearing is part of the comment process on the draft EIS/EIR. It will be closed December 20th, 1999. A record of decision by the Secretary of the Interior is expected in the early spring of 2000.

On behalf of the U.S. Fish and Wildlife Service, the Bureau of Reclamation, the Hoopa Valley Tribe and Trinity County, I thank you for the effort you have made to attend this meeting and also thank you in advance for your comments.

Now I'd like you to listen to some introductory remarks from Supervisor Chris Erickson, who is a

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representative from Trinity County.

Chris.

MR. ERICKSON: Thanks. I'm Chris Erickson, Supervisor from Trinity County. And the reason Trinity County is interested in these hearings is that we're the lead agency under the California Environmental Quality Act for this document.

On my right is Mike Orcutt from the Hoopa Valley Tribe.

Mike.

MR. ORCUTT: Good evening. I'm here on behalf of the Hoopa Valley Tribe. I just wanted to make some brief remarks, kind of give you the sense of kind of where we're coming from.

The tribe that owns about 90,000 acres of land on the lower Trinity River and fish and wildlife resources of the basin are important; they have been important to the survival of the Hupa people for a good number of years. The tribe has records of village sites, people, and the Hoopa people being on the lower Trinity River and at least -- being there at least 7500 years. And the status of that resource is one in which some of the background information that is available will state, as well as in the EIS, is that the status of the resources, one of which -- at least one species is listed under the Endangered

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Species Act, and steelhead, another important species, is probably going to be listed in the near future. So I think the trend in the basin is one in which there's some steady declines. We know some of the reasons behind that. And as is stated in some of the earlier remarks here, Congress has intervened, seeing the importance of the fishery to the basin, the people there, and the 1992 CVPIA legislation, then, is part of the mandate that's being fulfilled here in terms of the flow study and the accompanying EIS.

So we're here tonight to gather comments. And I want to thank you in advance for taking an interest in this important issue.

MR. SMITH: Good evening. My name is Russell Smith. I'm the Environmental and Natural Resources Division Chief of the Northern California area office. It's located at Shasta Dam.

The Trinity River is part of the Trinity division of the Central Valley project, and our office administers that project. I've been working to restore the fish and wildlife for the Trinity Basin for 11 years and represented reclamation in this EIR/EIS process.

THE HEARING OFFICIAL: Thank you.

Public comments on the draft EIS/EIR will be accepted until December 20th, 1999. After review and

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consideration of your comments, the four co-lead agencies, along with the cooperating agencies, will prepare a final EIS/EIR.

The purpose of this hearing is to receive your comments on the draft documents. Comments on all aspects of the alternatives described in those documents are very important and will be carefully considered. Because of the importance of your comments, it is necessary that we follow certain procedures here this evening.

If you want to present comments at the hearing, please register at the table outside this room. When you register, indicate any organization that you represent. When you are called to present your comments, please come forward to the microphone in front. Begin your presentation by stating your full name, spell it for the record, and indicate if you represent an organization.

This is an informal hearing, and therefore you will not be questioned or cross-examined in connection with your comments, nor will any of the representatives of the agencies at the front table respond to your comments.

Your comments or questions are being recorded by the reporter to preserve them for the record. Please keep in mind that the reporter will not record any statements from the audience or which are made to the audience. Comments must be made into the microphone and addressed to

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the agency representatives at the front table. Please leave a copy of any written material to which you refer with the reporter or with the registration staff. If you are reading your testimony, we ask that you read slowly for the reporter to be able to record your comments and have a verbatim record of those comments.

Instead of presenting oral comments here this evening or in addition to oral comments, you may submit comments in writing. Written comments may be submitted this evening to the staff at the registration table or they may be mailed to Mr. Joe Polos, P-O-L-O-S, U.S. Fish and Wildlife Service; 1655 Heindon -- H-E-I-N-D-O-N -- Road, Arcata, California, 95521. This address is available at the registration and information tables. Written comments will be accepted through December 20th, 1999. Written comments will be given the same consideration as oral comments that are presented here this evening.

At this time we are ready for our first speaker.

Ms. Emelia Berol, would you please come to the microphone, state your name and spell it for the record, identify who you represent, and begin your comments.

MS. BEROL: Good evening. My name is Emelia Berol, E-M-E-L-I-A B-E-R-O-L. I live in Arcata, California. I've lived in Northern California all of my life, and I

moved to the South Fork Trinity in 1971 and lived there for nine years. I've been interested in Trinity River and South Fork Trinity issues since those days. The last five years I've been working as an environmental journalist and videographer on the Trinity River and produced a documentary last year about the Trinities, so I'm very familiar with the issues.

I was not involved with the scoping for this flow study. I wish I had been, because I feel that the study, the way it was designed, is a bit of a stacked deck. I really don't like the fact that there was not an alternative between 48 percent and 98 percent. I don't think that's really rational. Recent studies have shown that there are other ways of managing the river besides taking half the water or putting all of it back in.

I also object to the fact that the "no dam" option was thrown out of the study. I understand that the -- there are reasons that supposedly justify why that option was eliminated, but, as a journalist, I've talked to a lot of people in Trinity County and Weaverville; I've spent a lot of time wandering around the streets of Weaverville talking to just everybody that lives there, works in the stores. I've interviewed a lot of people for articles I've written and for the video I made. And I don't know anyone in Trinity County -- I honestly don't know anyone

that wouldn't like to see the dam come down. I think it's a terrible injustice that that was not even looked at.

I also notice that three of the alternatives, the "no action" and the state, and there's another one, all of them seem to favor the benefiters of the dams, the people who use the resource. It doesn't benefit the people of Trinity County. So I think it would have been fair to them to at least consider the "no dam" option.

With that said, I'll go on.

The EIS -- this is falling over. I want to read from the executive summary, what it says, the purpose and need for the action.

It says: "The purpose of the proposed action is to restore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam. The need for this action results from Congress. One, mandate that diversions of water from the Trinity River to the Central Valley project not be detrimental to Trinity River fish and wildlife resources; two, finding that construction and operation of the Trinity River division as well as other factors have contributed to detrimental effects to habitat and have resulted in drastic reductions in anadromous fish populations; three, finding that restoration of depleted stocks of naturally produced anadromous fish is critical to the dependent

tribal, commercial and sports fisheries; and, four, confirmation of the federal trust responsibility to protect tribal fishery resources affected by the TRD.

So what I'm reading here is that this is not about all those other economic factors; it's about restoring the fish. The maximum alternative is probably the one that will most likely restore the fishery. Taking down the Lewiston Dam is my vote, for starters. If you really want to restore the fishery, you can't restore the fishery without the water.

Secondly, the use of the water, I think, is wasteful. You can grow cotton in many other places in the world besides the westlands. I used to grow alfalfa in my orchard in Willow Creek, and I grow lettuce in my garden every year, and any fool can grow lettuce. Only wild rivers produce wild salmon, and the wild salmon are disappearing. We're losing our salmon. We're losing the steelhead. The Trinity River is a sourced river. As the Trinities fisheries collapse, all these other rivers throughout this region are collapsing. The Trinity is the biggest tributary of the Klamath River. The Klamath River ESU is very important. If we lose that -- I mean, the Sacramento and the Rogue are the biggest -- it's the biggest river system in between those two large river systems. We have a great responsibility here.

The preferred alternative is certainly the least that would be acceptable. The least. I don't like that this is -- could be turned into a political issue. I mean, I think we have plenty of good science. We have plenty of good legal grounds that are stated in the executive summary.

So, in closing, I ask you to make the decision, to encourage the decision, that will restore the fishery, truly restore the fishery. Mechanical manipulations have proven themselves costly and not necessarily effective.

So that's all I have to say. Again, I would like to just reiterate that we're losing our wild salmon stocks all up and down the West Coast. The Trinity River is one of the most important fisheries that we had in this entire stretch of the West Coast, and I think that needs to be a priority consideration.

Thank you.

THE HEARING OFFICIAL: Thank you for your comments.

Our next speaker is Kristi Wrigley.

MS. WRIGLEY: My name is Kristi, K-R-I-S-T-I, Wrigley, W-R-I-G-L-E-Y. And I live in Elk River. I've lived in Humboldt County most of my life. I was educated out of here and lived out of the county for ten years.

I would like to say that in the last couple of months I went to a Water Quality meeting where we listened

to a gentleman tell us about the studies on the Trinity River, and when the dam was originally designed they did a study to see how much of the water that should be diverted, and I don't remember the exact alternative but I'll be pretty close. It was something like 52 percent -- was not more than 52 percent of the water should be diverted. And recently another study was conducted over many years at a cost to us that do our best to pay our taxes, and it determined that the process of the diversion shouldn't be more than 53 percent. And right now it stands at 71 percent. It's gone as high as 90 percent, that I'm aware of.

I do not understand how the political strengths can override the pragmatic and the science that has so strenuously been put into these studies and to take the water away. It does not make good sense. You are -- we are the ones that are really paying the price. The fish are paying the higher price. It does not make sense to divert more than 30 percent, in my understanding, of using common sense, good judgment and consideration for the environment that we are trying to live from over the long run.

I also am of farming heritage, and find it rather deplorable that we export water to an area to grow food and truck it back up here when we could produce more of

that food ourselves, if we could make use of some of our own growing lands up here. But it's not a very viable alternative right now. Water's pretty expensive.

So I would be advocate that you -- certainly not more than 30 percent, if that much, if you really want fish, and we do, take the dam down.

Thank you.

THE HEARING OFFICIAL: Thank you.

Jesse Noell.

MR. NOELL: My name is Jesse Noell, J-E-S-S-E N-O-E-L-L. Thank you for the opportunity to speak tonight.

It's my understanding that there are problems with fish populations. Several of the commenters have pointed this out, and I understand that that was the reason for the flow study in part, to look at the impacts on the fish population, including temperature. And Emelia Berol just pointed out that she was advocating removal of the Lewiston Dam. I'd like to know why it was that that was not considered. It seems that that would provide eight or nine more miles of habitat and for spawning and rearing, and that's one of the things that needs to be accomplished if we're to bring back the fish, is an increase in that. Seems that that would fit one of the objectives of the proposed -- I might have to put on my glasses here for a

minute -- the purpose and need to restore the natural production of fish and wildlife.

So it's my understanding that the scoping for this project and the alternatives was developed more than a decade ago. Can you tell me whether that was true?

Mr. Halstead?

THE HEARING OFFICIAL: Mr. Noell, we're really here to get your comments, concerns and questions, and we're not answering those questions, at least in the hearing here. If we do take a break, I would encourage you to seek some of the Fish and Wildlife Service staff that will be at the information table to have that discussion, but here we're just really taking your comments and entering into the record.

MR. NOELL: Okay. It is an invitation to come back up and speak, then?

THE HEARING OFFICIAL: Well, again, we will not have a response here this evening on the record to the questions, but they can certainly be a part of a discussion that you would have with staff from the Fish and Wildlife Service if we take a break from the hearing. But the purpose and the time allotted was really to allow everyone a chance to speak and give comments on those draft documents.

MR. NOELL: And that was to get -- I suppose to

give people who don't write an opportunity to speak into the microphone and have the court recorder record what they said, right?

THE HEARING OFFICIAL: Well, again, it is not intended to be a question-and-answer type of a session; we're here to listen to you and everyone else that may have something to say about the proposal.

MR. NOELL: Okay. Thank you for considering my comments, and I hope that you'll reopen the scoping to address some of these alternatives that have not been given proper consideration. I think it's important in this case, because both the coho and now other salmonids are being listed, and they weren't considered. That wasn't right at the time, at the time that the scoping of the issues was developed.

So, with that, I close my remarks, and I thank you.

THE HEARING OFFICIAL: Thank you.

Denver Nelson.

MR. NELSON: I spoke to you once before. Can I speak again?

THE HEARING OFFICIAL: Yes.

Please state your name again and spell it for the record.

MR. NELSON: Denver Nelson, N-E-L-S-O-N.

I gave you sort of a technical talk earlier today,

and I was inspired by the Hoopa tribal chairman, who outlined that he -- his people had lived in the area for 10,000 years, and, you know, the legal precedent for that, of course, is the Tribal Trust Act, which is taken care of, or at least talked about, in these documents.

There's another -- you know, I have had a place on the Klamath River for many years, and I feel probably as strongly as the tribal chairman does about the river, and I think the legal precedence for that is the Public Trust Doctrine. And I actually went home and reviewed, did a search on the CD of these documents, and there is not much mention of the Public Trust Doctrine. So I came back to make sure that the Public Trust Doctrine is included in your discussions and decisions. I have brought it up once before at a Bureau of Reclamation hearing and people didn't know what it was, so I thought I would quote to you what the Public Trust Doctrine is.

It's a -- and this is from the state lands Department, the solicitor.

"The public trust doctrine is an affirmation of the duty of the state to protect the people's common heritage in streams, lakes, marshlands and tidelands, surrounding that right of protection only in rare cases when the abandonment of that right is consistent with the purposes of the trust. And, of course, the Public Trust Doctrine

is the basis for the Mono Lake decision which overturned the water rights of Los Angeles County and that changed the flow of the Los Angeles aqueduct, and I think it's very important to understand and use that as one of the legal precedences in -- along with the Tribal Trust Doctrine for sort of nontribal people. I think it's very important that you consider and act upon the Public Trust Doctrine in the flow studies and in the EIR and EIS.

Thank you.

THE HEARING OFFICIAL: Thank you for those additional comments, Mr. Nelson.

Jaime O'Donnell.

MR. O'DONNELL: Hello. My name is Jaime, J-A-I-M-E, O'Donnell, O-D-O-N-N-E-L-L. I'm the owner of Aurora River Adventures. It's one of the largest whitewater rafting companies in the northwest part of California. We are based on the Trinity River. I am also on the board of the Friends of the Trinity River. I'm one of the liaison and lead members of the Six Rivers Outfitter Guide Association. And I'm also a designated rep for California Outdoors, which is the largest trade association for commercial whitewater rafting companies in California.

I'm here to express my concern and absolute conviction of the economic benefits and prosperity on the

North Coast that can result from additional water flow on the Trinity River.

Although I'm aware this decision is focused on restoration of fish and wildlife, I want to elaborate on a complementing benefit that increased water flows will have on commercial rafting and tourism. I appreciate the opportunity to finally make comment on this long overdue EIS/EIR. I believe the time has come to complete this process, and I urge you not to extend the comment period beyond the December 20th deadline that is currently established.

I'm preparing for my thirteenth year in commercial whitewater rafting industry in Northern California, with the Trinity River being my company's single biggest, most important river used in commercial rafting. Over the past decade, commercial rafting has increased dramatically on the Trinity River, with locally owned companies being the largest commercial users on the main fork and its tributaries. In the mid-nineties, the Big Bar Ranger District saw 100-percent increase annually in commercial use. In 1988, previous to additional water flow being released, there were simply 500 commercial user days. By 1994, there was 5,000 commercial user days. That's 1000-percent increase in a six-year period of time. Most of this increase occurred in the years of 1992 through

1994. This is the same time period the administrative appeal had been filed by the Hoopa tribe, which guaranteed a minimum water flow of 340,000 acre-feet per year. Essentially, increased water flows equated out to increased boom and business that was nonexistent to pre-1988.

Most rafting companies on the Trinity have shown a steady increase in growth over the past decade, some years showing more than a 25-percent increase annually in the number of commercial whitewater user days. It's clear to me that this demonstrates that a reliable water flow has an impact on the growth of commercial rafting on the Trinity River. Of the 22 permitted rafting companies on the Trinity River, 50 percent are Northern California, locally based operations. These 12 rafting companies boat primarily on the Trinity River, and that's defined by at least 60 percent of their gross revenues achieved on the Trinity. The approximate annual gross revenue generated by these companies is between 400,000 and $500,000. The California State Office of Tourism has statistical information that shows a recycling factor of approximately 3.5 times for the recreational tourism dollar. Specifically, this means that for every dollar generated by North Coast rafting companies, these dollars are reused within our host communities 3.5 times. Therefore, the

economic impact of commercial rafting alone comes into the range of 1.4- to 1.75 million dollars annually.

Downstream users benefitting from this explosive growth include restaurants, motels, service-provider companies, private and government campgrounds. Economic gain is not only generated by the visitor or specific client, but it is also felt throughout the counties by the amount of employment opportunities. My business has experienced a rapid growth in payroll and number of employees annually since about 1995.

Additional water releases during low run-off months, specifically, from July 1st through September 30th, would ensure an adequate, reliable supply of water to allow our industry to continue to grow and contribute to the economies of Humboldt and Trinity counties. Increased water flow during these times would have significant impact, enabling companies to book trips to the end of September. Currently, most commercial outfitter reservations are sharply reduced after Labor Day, when the flow has traditionally been cut back to an inadequate level to perform commercial ventures.

Another specific economic gain for rafting companies would be the opportunity to utilize the Burnt Ranch Gorge throughout the summer. Although there are only four permits issued on the gorge, the use can be

extremely high. The season for the gorge is completely dependent on flow and release. Increases of water from the current 450 to approximately 800 CSF from July 1st to September 15th would guarantee those outfitters an opportunity that presently ends sometime in early summer. Although my expertise is in commercial uses of the river, the use of private individual boaters, boating and canoeing clubs and rental companies also has dramatically increased over the past decade. Additional water releases would also greatly augment this use. Despite the difficulty in accumulating exact figures for private use, they also have a significant impact on the economy of the Trinity River Basin in both counties.

In closing, I'm urging you to support additional water releases for the economic benefits of the recreation industry, our affiliates, and other downstream users. The original legislation creating the Trinity River division clearly prioritized Trinity fish and wildlife over any diversions to the CVP. I believe the flow evaluation alternative will provide the Trinity River with adequate water needed to restore the fisheries and support the developing recreation tourism dependent on the Trinity River.

Thank you.

THE HEARING OFFICIAL: Thank you for your comments.

Aida Parkinson.

MS. PARKINSON: Good evening. My name is Aida Parkinson. It's A-I-D-A P-A-R-K-I-N-S-O-N. I've been a resident of Humboldt County since 1992, and I'm a native Californian for about several generations back. I'd like to comment on the recreational analysis for the whitewater boating section.

Table 3.32 identifies a preferred flow range for whitewater rafting and kayaking as 300 to 8,000 cubic feet per second. Three hundred curb feet per second is too low for safe and enjoyable whitewater kayaking. I've kayaked about 100 days a year since probably 1994. I actually have a full-time job. I have kayaked at least once a month since 1993 throughout the year, and I average about 30 runs a year on the mainstem of the Trinity at all water levels, between 300 up to about 15,000 CFS. Four hundred fifty CFS would be a more preferred minimal flow. An optimal flow was not really identified in your recreational analysis, and there are presently standards for developing preferred thresholds for whitewater kayaking. FERC is using those in its relicensing projects.

With respect to alternatives for restoration, restoration of the Trinity River ecosystem requires a minimal diversion from the river. What's good for the

fish will make the kayakers happy. The flow schedules under the flow evaluation alternative do not provide sufficient water for restoration of the fisheries. My preference would be for a dam-removal alternative, and that particular alternative should probably be carried through for a full analysis in the final EIS.

We appreciate the opportunity to comment on this. Thank you very much.

THE HEARING OFFICIAL: Thank you for your comment. Dan Doble.

MR. DOBLE: Good evening. My name is Dan, D-A-N, D-O-B-L-E, and I represent myself and the Northern California council of Trout Unlimited, which I am the Northern California president of.

At this time our membership has had some interest, of course, and that's because we are very profoundly interested in the salmon and steelhead restoration in all of Northern California, Trinity River being a particular interest. Historically, the runs were some of the best courses in the nation. The membership that I hold myself and others representing several thousand members in our state have the unique opportunity, having been educated, to some extent or another, as to the environmental recourse and the circumstances involved with the removal of water from the river. The response has been almost

universally, even though, of course, life in the valley is somewhat dependent on water resources there, that the only fair alternative, given only two choices of 42 percent or 98 percent, would of course be favorable to the 98 percent return of water. Privately, most would support removal of Lewiston Dam with very, very little urging.

I would like to go on record as supporting the most possible return of water to the Trinity River for all the economic, recreational and, of course, for the fish themselves.

I thank you very much for allowing me to comment.

THE HEARING OFFICIAL: Thank you for your comment. Dave Morrow.

MR. MORROW: Good evening. My name is David Morrow, M-O-R-R-O-W.

Thank you for the opportunity to speak to you tonight.

My family are farmers in the Central Valley, and in Paso Robles area of San Luis Obispo County. We grow small grains and we have vineyards, and those crops are heavy water users. We pump fossil water from deep wells, and our irrigation costs for vineyards can average about $1,000 a day for a 40-acre block. That would be usually irrigated once a week for about 20 weeks a year.

One of the problems that we have as growers is

trying to compete with farmers who have access to the canal water, which is heavily subsidized by the federal government through the construction of dams and canal system. And I probably would not be popular with those users in advocating more of a fair market.

The basic thing that I've seen in farming is that when a resource is cheap it's wasted. For instance, my family uses drip irrigation on our vineyards. People in other parts of the valley who have access to what we call "ditch water," or the Central Water project or other sources like that, usually use furrow irrigation, or sometimes they'll use sprinkler sets. And sprinklers have about a 40-percent evaporation rate. Furrow irrigation is very wasteful, because you have to put a lot of water in at the beginning to push it out to the far end of the field, and there's a tremendous amount of water loss down below the root zone at your initial point of pumping.

Now, people say, well, that's family farmers who are dependent upon those water sources. One of our neighbors who grows cotton is Westlake Farms. Their 9,000-acre farm, they pump water using D-8 and D-9 cats through pumps that have a 20-inch outfall in roughly 10,000 gallons a minute, and they irrigate cotton and other crops with, again, heavily subsidized water.

So when we look at the economics of this project, I

think, just on a fairness doctrine, it would be much more efficient if the farmers who receive water from the Trinity and other systems like this paid the fair market value and they were actually competing on a level playing field, because right now, through the system that's been devised back in the fifties and sixties, you know, it's an inefficient allocation of resources.

I went over to the dam yesterday, which was the anniversary of President Kennedy's death, and listened to his voice at the dam. You can push the button and you can hear him talking about this wonderful dam and how it's providing a use of the water and it's no longer wastefully going out into the ocean. That was a few months -- I think in July, he gave that speech, a few months before his death in 1963. Well, times have changed. You know, the population of the United States is about 100 million more, and the population of California has quintupled. There's a tremendous demand on resources for fisheries, for recreation, for wildlife, and the amount of wild resources has really diminished to the extent that the Trinity is a real gem.

And I advocate restoration of the flows to the water that will sustain a real healthy fish population. The fish is obviously a real important part of the food chain for the birds and the animals that live along the

river, and the people who actually lived on fish for part of the year. There's a lot of poor people in this county who have told me that they used to eat a lot of salmon and steelhead when it was an abundant resource. We've kind of forgotten about them in the whole economic matrix.

Eventually, I advocate just removing the dam, and I think it's only fair to consider that in the EIS. You can look at it in terms of wildlife or in terms of recreation, but also it's just a matter of fairness to the other farmers that we remove these unfair and inequalities and these subsidies that make people like myself or my family, actually drives own tractors and don't have a big operation -- it gives us a lot more of a chance.

Thank you.

THE HEARING OFFICIAL: Thank you, Mr. Morrow, for those comments.

Wendy Ring.

MS. RING: Good evening. My name is Wendy Ring, and I'm a family doctor who's worked for the past nine years in a mobile clinic serving low-income people in Humboldt and Del Norte counties. Among my patients are hard-working fishermen who are unable to afford health care for themselves or their family; owners of small, tourism-dependent businesses severely impacted by sport-fishing limits, and Yurok and Karuk native people

struggling with alcohol, drugs and family disruption arising from the loss of their cultural heritage and traditional way of life.

Diverting water from the Trinity River causes not only environmental degradation but also economic, social and spiritual impoverishment of our region. The dam, in human terms, is already grave. It has taken my profession a long time not to play God. Who are we to decide that the salmon god put here in our rivers or the people who depend on them have less value than the profits of agribusiness. When you take our water, you take our future. Please give us back our wild and free-flowing river.

Thank you.

THE HEARING OFFICIAL: Thank you.

At this time we have heard from everyone that filled out a slip and registered to speak. If there's anyone in the audience who wishes to make a statement at this time, please go to the registration table and fill out a card, and you'll have an opportunity to do so.

If there's no one that wishes to do so at this time, we'll go off the record and reconvene when we have someone in addition that wishes to speak.

We're off the record.

(Off the record.)

THE HEARING OFFICIAL: We do have one more person that wishes to make a statement, so we're back on the record.

And at this time I'd like to invite John McKeon to come up to the microphone, please. State your name, spell it for the record, and indicate who you're representing.

MR. MCKEON: My name is John McKeon, M-C-K-E-O-N. I'm a senior associate with the environmental consulting firm of Affiliated Researchers with offices in Michigan and California. I am a commercial fisherman; until recently, owner of Fish and Game vessel number 22354, the "Cindy Lee." I'm a board member of the Humboldt Watershed Council. I am here tonight on my own behalf as a professional biologist, as an owner of a drift boat, and a sportfishing enthusiast.

Before I start, I'd like to commend all the people who have put so much hard work and time over the years in attempting to rebuild the stocks of Klamath/Trinity River fish.

The Trinity River flow studies have focused on the physical habitat parameters created by reduced flow and changed flow regimes in the Trinity River itself. The wider ecological impacts to a much greater environmental sphere have received little attention. Have the Trinity River flow studies given consideration to the temperature-

ameliorating effects that historically massive spring and summer snow-melt flows of the Trinity have on the temperature-plagued Klamath River? Before the reduction of flows, almost 50 miles of the Klamath below the confluence of the two rivers was once likely a highly productive nursery habitat for outmigrating juvenile salmonids of both rivers. Historically created by the warm, organically rich waters of the Klamath, flowing from the Oregon deserts and commingling with the cold mineral-rich waters of the Trinity Basin mountain snow melt, it was the classic conditions for an ecological bloom. The loss of this nursery obviously reduces the size and, thus, survivability of ocean entry of both Klamath and Trinity salmonid outmigrants. No amount of manipulation of physical habitat parameters can mitigate this present impact of the Clare Engle Dam. Return of the unimpeded natural Trinity River flows is the only physically possible method of recreating this formerly, incredibly productive habitat of the Klamath/Trinity River system.

Have the Trinity River flow studies investigated impact of the yearly loss of hundreds of millions of salmonid outmigrants of the Klamath/Trinity system on the predator/prey relationship of so-called ocean conditions? William Percy, in "Ocean Ecology of North Pacific

Salmonids," calculated that just the common murre marine population consumes 150,000 juvenile salmonids per day. With the crash of Klamath Trinity salmonid populations, the highly mobile predators of the sea, both avian and mammalian, obviously flock to and congregate at the other mouths of rivers up and down the coast and hammer the limited populations of the smaller rivers, such as the Chetco, the Elk, Redwood Creek, the Smith, the Mad, the Eel, the Mattole, the Sixes, the Pistol, et cetera, et cetera.

It is my opinion, as a professional biologist, that arguments of similar coast-wide fluctuations of salmonid populations which point to vaguely defined ocean conditions can, to a great degree, be attributed to this impact of Clare Engle Dam on the ocean ecology of predator/prey relationships. Again, return of unimpeded natural flows to the Trinity River is the only physically possible method of rebalancing the predator/prey relationships in protecting the smaller rivers from over-predation.

Have the Trinity River flow studies considered the impacts of Clare Engle Dam on the salmonid metapopulation structure of the Klamath/Trinity system? Cooper and Mangel, 1998, in a study titled "The Danger of Ignoring Meta Population Structure for the Conservation of

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Salmonids," published in Volume 97 of the National Marine Fisheries Service "Journal of Fisheries," found that the various demes, or populations of individual streams of the Columbia River system, could be classified as either sources or sinks of the greater metapopulation of the system. They attribute this phenomenon to the evolutionarily stable strategy of a documented, up to 27-percent strain of chinook populations, and up to 40-percent strain of coho, in their spawning returns to fresh water. They found the danger to fisheries investigations are that by simply monitoring so-called pilot-indicator streams, such as Pine Creek on the Klamath or New River or Horse Linto Creek on the Trinity, that although populations may hold steady or even increase for as long as 20 years, those results can be due, to a large degree, to the strain effect from source stream populations. With the change from source streams to sinks through habitat degradation, inability to successfully complete outmigration or change predator/prey relationships of ocean conditions, entire metapopulations of salmonids can crash with little or few warning indications.

Clare Engle Dam effectively eliminated many likely source stream population demes. Genetic studies as early as 1980 chronicled in "Salmonid Ecosystems of the North Pacific," in the study "Population Structures of

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Indigenous Salmonid Species of the Pacific Northwest," by Fred M. Utter, et al., identified the unique alleles carried by upriver stocks of the Columbia Basin metapopulation. The loss of the genetic diversity of alleles carried by the fish once spawning and rearing in the year-round cold water streams above Clare Engle Dam cannot be mitigated by any processes or procedures instituted at the Trinity River hatchery.

Again, return of unimpeded natural flows to the Trinity River is the only possible method of rebuilding the genetically viable and diverse Klamath/Trinity meta-population structure of salmonid stocks to historic levels.

In conclusion, I would like to read the abstract of the Cooper and Mangel study, "The Danger of Ignoring Metapopulation Structure in the Conservation of Salmonids."

"Abstract: Because of their tendency to return to natal streams, salmonid populations have often been viewed in ecological isolation. Although the notion of an evolutionarily significant unit, ESU, recognizes dispersal on evolutionary time scales, we investigated the consequences of dispersal. Strain, on an ecological time scale, where strain creates a metapopulation structure for salmonid streams within an ESU. We developed a simple

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model for salmonid metapopulations, focusing on source and sink populations, and used the model to highlight the dangers of ignoring this structure in conservation efforts. We show that exactly the wrong conservation efforts may occur if metapopulation structure exists but is ignored.

Thank you very much.

THE HEARING OFFICIAL: Thank you for your comments. Is there anyone else that wishes to make comment? I don't have any other registration slips, but this is your last chance. If you would like to make a statement, please fill out a registration slip. We do have a few minutes left before the hearing is scheduled to be adjourned.

If not, we'll go off the record right now.

(Off the record.)

THE HEARING OFFICIAL: We're back on the record. We have received no additional slips for people wishing to make a statement, so on behalf of the U.S. Fish and Wildlife Service and cooperating agencies, we appreciate the time and effort that you took this evening to present your comments. They've been very informative and will be fully considered in coming to a final decision.

The hearing is closed. We're off the record.

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[Hearing concluded.]

STATE OF CALIFORNIA)
) ss.
COUNTY OF HUMBOLDT)

I, TANIA N. BRUNELL, Certified Shorthand Reporter of the State of California, do hereby certify that I reported and transcribed the foregoing pages 1 through 83, in the matter of the EIS/EIR for the Trinity River Mainstem Fishery Restoration, November 23, 1999.

DATED this ______ day of __________, 1999.

TANIA N. BRUNELL
CSR #4277

Attachment 4

X2 Position

Run Date 12- 9- 98
X2 Position (Roe=64 Chipps=74 Conflu=81)
NA3_P27M = PROSIM99;CVPIA PEIS NAA;C09A;BDPA;1993 WRBO;L2 REFS
Equation is +x2_pos 30
Report is in ascending order by year

Units are in TAF

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	82.2	83.3	79.0	76.3	66.4	65.7	68.4	63.7	64.8	74.5	78.0	82.0	884
1923	85.2	81.7	70.6	67.0	70.7	73.5	69.6	73.6	77.2	79.0	80.8	82.3	911
1924	84.5	84.8	81.9	81.1	78.2	76.9	81.0	82.4	85.6	86.7	88.2	89.7	1001
1925	88.2	86.4	82.5	82.0	64.4	65.0	67.4	73.5	77.0	80.1	83.0	83.6	933
1926	86.0	85.9	84.0	80.1	68.4	73.4	71.2	74.0	79.6	83.0	86.2	85.9	958
1927	86.8	76.8	74.1	67.8	55.4	58.9	59.2	66.0	73.6	77.4	78.5	82.1	857
1928	85.1	76.8	78.5	73.2	71.0	57.8	64.2	70.2	76.7	78.5	79.6	82.4	894
1929	85.6	83.9	81.4	80.0	77.8	77.0	79.3	80.9	80.8	85.1	87.7	89.6	989
1930	87.4	86.4	82.3	76.3	74.9	69.6	74.2	77.4	80.7	83.4	85.9	84.2	963
1931	85.9	85.9	83.8	81.8	79.7	80.1	79.8	81.1	85.0	86.5	88.2	89.2	1007
1932	86.0	85.6	77.3	73.1	68.9	73.5	74.8	76.6	76.3	81.9	85.7	85.3	945
1933	86.0	84.5	82.8	81.3	79.9	77.8	76.8	80.7	80.9	85.1	87.7	89.5	993
1934	88.0	86.2	82.3	78.8	75.3	75.3	76.0	80.6	81.0	85.2	87.8	89.4	986
1935	86.4	83.6	83.5	72.9	74.5	69.8	62.6	64.6	73.5	79.0	80.1	82.4	913
1936	84.6	84.6	81.7	69.9	58.1	62.4	67.4	72.7	76.1	79.2	80.5	82.5	900
1937	85.7	85.3	81.8	81.1	66.7	61.1	66.2	70.0	74.3	79.3	80.3	82.5	914
1938	85.7	76.8	65.6	65.9	53.9	47.4	51.5	53.4	59.1	72.0	77.3	79.1	788
1939	77.8	80.4	80.5	77.1	77.1	76.4	76.3	78.7	81.0	83.5	86.4	85.6	961
1940	85.0	83.6	83.0	70.5	59.8	53.0	55.2	66.9	75.7	78.1	79.5	82.6	873
1941	85.7	84.8	68.4	56.7	51.1	51.2	52.8	58.2	67.2	75.3	79.5	81.0	812
1942	79.5	80.1	63.7	56.0	49.4	59.3	59.0	61.5	66.0	75.0	79.4	82.2	811
1943	80.9	75.3	69.9	57.9	57.0	53.3	61.3	68.3	76.1	78.3	78.9	82.2	839
1944	85.6	84.7	81.9	79.9	72.3	71.3	75.4	78.2	78.7	81.0	84.3	84.0	957
1945	86.2	82.7	78.8	80.4	65.2	65.4	72.1	76.1	76.6	79.5	80.8	82.7	926
1946	85.7	80.6	64.3	60.9	65.6	69.9	74.1	75.0	77.1	79.5	81.1	82.9	897
1947	85.8	84.2	81.8	81.4	76.9	74.0	75.0	78.3	81.0	83.5	86.4	86.6	975
1948	87.0	85.6	85.1	82.4	77.6	75.1	68.5	66.8	71.8	77.2	80.5	83.1	941
1949	85.3	84.7	81.5	81.1	79.5	66.9	74.0	75.0	78.5	81.6	84.4	84.2	957
1950	86.2	85.6	84.3	77.1	68.8	70.2	71.3	74.0	76.9	79.3	81.2	83.3	938
1951	84.5	68.5	57.2	55.3	55.6	60.8	68.7	72.3	77.4	78.3	79.3	81.9	840
1952	85.4	80.6	67.5	56.7	54.7	54.2	54.4	54.7	59.8	69.5	75.4	77.7	790
1953	78.0	78.1	66.1	55.4	63.0	67.9	71.8	70.0	70.8	76.5	78.7	82.1	858
1954	83.0	78.4	80.7	71.0	62.1	60.1	61.1	67.1	75.7	78.1	79.3	82.3	879
1955	85.6	81.2	74.3	73.4	74.6	76.9	78.9	79.5	79.2	82.3	85.2	84.6	956
1956	86.4	85.0	62.4	50.5	51.1	58.0	66.4	63.1	68.8	75.9	78.7	79.9	826
1957	77.1	81.9	83.0	80.3	70.2	63.6	68.9	72.6	76.3	78.2	79.3	81.9	913
1958	78.1	79.6	74.7	66.9	51.8	50.4	50.3	56.4	60.5	72.5	76.8	75.9	794
1959	78.8	82.1	82.7	69.1	62.1	67.9	75.3	77.7	80.0	81.1	81.1	82.5	920
1960	84.8	84.8	81.8	81.0	72.2	72.1	74.2	78.1	80.9	82.2	85.1	85.5	963
1961	86.7	83.3	81.9	81.6	71.5	72.8	75.5	78.4	81.0	83.5	86.0	86.2	968
1962	86.2	85.4	82.3	82.5	65.6	65.5	72.2	74.3	78.9	80.7	81.0	83.1	938
1963	72.1	78.0	72.4	75.9	62.0	64.2	55.8	62.9	72.9	77.1	78.4	82.0	854
1964	80.6	72.1	79.0	72.2	74.3	77.3	78.9	79.3	80.8	82.6	85.9	85.6	949
1965	85.7	82.6	62.3	53.0	60.5	66.4	61.7	66.6	74.8	77.8	78.8	83.2	854
1966	85.9	75.4	77.0	69.2	69.1	70.0	74.2	75.1	79.1	80.8	81.2	83.4	920
1967	85.5	80.1	68.7	62.6	59.5	57.1	57.2	57.2	59.5	67.4	74.9	76.9	807
1968	78.7	80.8	78.0	69.0	60.2	62.2	71.4	76.7	79.6	80.9	80.9	82.5	901
1969	84.6	83.5	74.7	57.3	50.1	52.9	54.9	56.4	62.0	72.6	77.4	76.9	803
1970	77.0	76.7	63.7	49.2	51.0	58.0	69.7	76.0	78.6	78.5	79.1	82.0	839
1971	85.5	75.0	62.9	60.7	65.1	63.1	68.1	68.0	71.5	76.7	78.4	81.7	857
1972	83.4	83.5	76.5	74.7	72.9	69.0	74.0	77.3	79.9	80.5	81.4	82.9	936
1973	84.1	76.0	72.7	60.1	54.8	56.0	66.8	72.6	74.6	77.4	79.0	81.8	856
1974	83.6	66.2	58.7	51.4	58.4	52.2	53.9	64.2	69.7	75.3	78.0	77.8	789
1975	81.3	82.5	80.0	77.5	62.6	55.3	63.9	65.3	68.2	75.7	78.4	79.6	870
1976	76.0	77.9	80.7	80.6	79.4	77.7	79.0	80.7	81.0	83.2	85.7	85.6	968
1977	87.4	86.7	86.1	83.7	80.1	79.7	81.0	82.7	85.7	86.7	88.3	89.0	1017
1978	86.1	85.8	82.4	64.6	59.2	55.1	58.1	65.7	73.6	77.4	79.1	82.8	870
1979	85.8	84.3	82.0	73.7	65.5	64.2	70.4	74.5	75.3	79.1	80.4	82.3	917
1980	84.9	81.6	77.6	59.6	51.0	54.5	65.5	70.9	76.0	78.2	80.1	83.6	864
1981	85.4	85.3	82.0	72.3	70.1	68.0	74.3	78.1	81.0	82.9	84.6	84.5	948
1982	86.3	71.1	58.6	54.4	51.5	51.4	48.0	56.2	64.4	73.6	76.1	73.4	765
1983	71.0	64.3	56.1	51.7	46.1	41.5	47.9	51.2	53.7	61.3	68.3	67.9	681
1984	70.2	58.9	49.7	52.3	58.0	61.8	69.7	76.2	77.5	78.5	79.2	82.2	814
1985	83.8	72.1	71.4	76.8	76.6	75.3	77.4	76.9	80.6	82.2	86.0	85.2	944
1986	86.0	84.6	81.8	76.4	52.2	47.9	60.9	69.6	75.0	77.9	78.8	82.1	873
1987	85.5	85.8	82.2	80.0	75.9	72.2	74.3	78.1	81.0	83.5	86.4	88.6	974
1988	85.0	84.8	81.8	73.9	74.8	78.2	79.5	81.0	81.0	85.2	87.8	88.7	982
1989	86.2	85.0	84.2	83.1	80.3	67.3	70.1	74.1	78.9	81.9	84.4	84.2	960
1990	86.2	86.0	85.3	80.1	76.9	77.9	77.0	78.3	81.0	83.7	86.4	87.6	986
Avg.	83.7	81.0	75.9	70.6	65.8	65.2	68.2	71.5	75.3	79.2	81.5	83.0	901

Run Date 5- 4- 99
X2 Position (Roe=64 Chipps=74 Conflu=81)
P99N_CI2 = PROSIM99;CVPIA PEIS R. CUMUL. IMP.;C09A;BDPA;1993 WRBO;L4 REFS;B2(US+
Equation is +x2_pos 30
Report is in ascending order by year

Units are in TAF

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	82.6	83.3	77.9	75.4	66.7	64.4	64.9	61.7	63.5	74.1	77.9	82.2	875
1923	83.7	80.7	70.3	66.4	69.4	72.2	68.1	70.2	75.2	78.7	80.6	82.3	898
1924	85.6	85.5	82.7	81.4	77.9	76.1	81.0	82.4	85.6	86.7	88.2	89.6	1003
1925	88.3	86.8	82.8	82.2	64.6	65.0	66.0	69.8	75.1	81.5	84.2	84.0	930
1926	86.2	86.0	84.3	79.7	68.1	72.6	69.5	74.0	79.6	83.0	86.2	86.0	955
1927	86.8	76.5	75.6	68.4	55.5	58.6	59.1	64.2	73.0	76.2	78.4	81.6	854
1928	83.7	79.9	79.2	73.6	71.0	58.9	62.8	70.2	76.7	78.5	79.4	82.4	896
1929	85.6	83.7	81.4	80.0	77.4	76.0	78.6	80.5	80.3	85.0	87.7	88.9	985
1930	86.5	84.8	81.8	75.5	74.2	69.6	73.3	75.1	80.0	83.1	84.6	85.1	953
1931	86.3	86.0	85.3	82.2	79.9	76.8	79.2	81.2	85.0	86.5	88.2	89.7	1006
1932	85.7	84.6	77.4	73.9	70.2	74.0	74.9	74.4	75.1	81.5	83.4	85.1	940
1933	86.5	85.9	83.3	81.4	79.9	77.4	76.5	78.7	80.6	85.0	87.7	89.1	992
1934	87.1	85.2	81.9	78.3	75.7	75.4	75.8	79.8	81.0	85.2	87.8	88.9	982
1935	85.3	83.8	83.7	73.2	74.4	70.1	62.6	64.6	73.0	78.8	81.6	83.2	914
1936	85.8	85.6	82.4	70.7	58.8	63.0	65.7	68.6	75.0	78.7	80.9	82.5	898
1937	85.7	85.8	82.0	81.1	67.2	61.7	64.5	68.2	74.0	79.2	81.2	83.3	914
1938	85.9	77.3	66.3	65.8	53.6	47.4	51.2	53.0	59.4	72.8	78.2	83.5	794
1939	78.9	81.2	80.2	78.6	77.3	75.7	75.8	77.4	80.7	83.4	85.8	85.9	961
1940	85.4	84.5	83.8	71.6	60.3	53.3	54.7	64.6	74.9	77.8	79.9	83.0	874
1941	85.8	84.8	71.0	57.5	51.3	51.4	52.6	57.7	67.9	75.6	78.7	83.3	818
1942	82.8	82.0	64.6	56.8	49.7	59.1	58.4	61.3	67.4	75.4	78.0	82.3	818
1943	84.5	80.4	72.2	58.8	57.6	53.7	60.4	65.4	75.2	77.7	78.9	81.9	847
1944	84.7	84.1	81.7	79.0	71.7	70.4	74.2	75.6	76.4	82.0	83.3	84.8	948
1945	86.4	81.3	79.1	80.5	66.5	66.6	69.2	71.5	74.8	78.7	81.1	83.2	919
1946	85.2	83.3	66.7	61.8	65.6	69.7	72.0	72.6	75.1	78.5	80.9	82.5	894
1947	85.7	83.9	81.7	81.3	76.6	73.3	74.3	77.1	80.6	83.4	86.1	86.3	970
1948	86.9	85.4	85.0	82.4	77.6	74.8	69.0	66.7	71.6	77.1	80.2	83.0	940
1949	85.1	84.6	81.5	81.1	78.9	67.8	71.4	74.0	76.2	81.9	84.0	84.8	951
1950	86.4	85.3	83.7	76.9	68.8	70.1	69.9	70.9	75.0	78.5	80.4	83.2	929
1951	85.2	69.0	58.8	56.1	55.6	61.2	67.8	69.1	76.4	77.9	79.1	82.1	838
1952	84.5	81.1	68.6	57.4	55.0	54.4	54.5	54.7	60.5	72.2	77.9	80.7	802
1953	79.2	81.3	67.5	55.9	62.3	66.9	69.4	68.4	71.6	76.3	78.5	81.7	859
1954	83.7	81.0	81.4	73.9	63.1	60.8	60.9	67.1	75.7	77.7	79.1	82.1	887
1955	84.8	81.2	74.8	72.2	74.0	74.9	75.9	75.6	77.0	82.2	85.9	85.4	944
1956	86.6	84.7	62.9	50.8	51.2	57.6	64.1	62.8	69.5	76.1	78.1	81.6	826
1957	83.9	83.8	81.9	79.9	73.5	65.0	68.9	69.2	74.7	76.9	79.1	81.6	918
1958	78.8	79.5	74.8	67.2	52.2	50.8	50.2	55.9	61.1	73.0	77.9	78.7	800
1959	79.4	82.3	82.1	70.0	63.3	67.9	73.5	74.9	79.0	80.8	81.0	82.3	916
1960	85.6	85.8	82.7	81.3	72.1	71.8	74.1	75.5	80.1	83.2	85.0	85.7	963
1961	86.7	83.1	80.5	80.5	71.6	72.3	74.9	75.9	80.2	83.2	85.8	86.1	961
1962	86.8	85.2	80.9	81.2	65.6	65.5	71.5	73.7	77.4	79.7	80.4	82.1	930
1963	72.4	79.2	73.4	75.3	61.6	64.6	56.0	61.6	72.0	75.9	78.3	81.7	852
1964	83.3	75.8	80.0	73.1	73.7	74.8	77.2	77.5	80.4	83.3	86.3	85.6	951
1965	86.7	81.5	62.3	53.2	60.2	65.5	62.4	66.6	74.3	77.4	78.5	82.4	851
1966	85.6	77.2	77.1	69.9	68.7	71.0	73.5	73.8	78.7	80.7	82.8	83.9	923
1967	86.1	82.4	69.9	62.6	59.5	57.6	56.9	56.9	60.2	69.4	77.3	80.4	819
1968	79.7	81.8	80.3	71.3	61.3	62.0	71.4	74.0	78.8	80.7	80.7	82.2	904
1969	85.6	83.7	76.1	57.8	50.4	53.1	54.8	56.0	63.0	73.8	79.2	79.4	813
1970	77.6	79.5	65.5	49.8	51.2	57.8	68.8	71.2	77.1	78.3	78.9	81.7	837
1971	85.4	79.3	64.5	61.3	65.1	63.9	67.0	66.0	71.9	75.7	78.4	81.7	860
1972	84.7	84.2	79.9	77.0	73.6	70.4	74.0	74.7	79.0	80.4	80.4	82.0	940
1973	83.7	78.0	74.6	60.9	54.7	56.0	64.4	69.4	74.0	76.6	79.0	81.8	853
1974	83.6	68.0	59.9	51.7	58.5	52.5	53.5	62.3	70.2	75.4	78.5	81.9	796
1975	82.1	82.6	80.0	78.2	63.8	56.0	61.6	64.0	69.3	76.0	78.4	82.5	875
1976	78.1	79.3	79.4	79.4	78.9	76.4	78.3	79.3	81.0	85.2	83.8	85.5	965
1977	85.1	85.3	84.9	83.9	80.7	78.2	81.0	82.5	84.1	86.2	88.1	88.8	1009
1978	86.2	86.7	82.4	65.1	60.7	55.7	57.4	62.6	72.4	77.0	78.8	82.3	867
1979	85.6	84.0	81.7	73.6	66.2	65.1	67.6	70.6	74.2	79.0	81.4	83.3	912
1980	85.0	83.0	78.5	60.3	51.6	54.5	63.2	66.9	73.5	77.4	78.8	83.6	856
1981	85.7	85.8	82.1	76.1	71.5	70.1	71.3	74.8	79.9	83.1	83.9	84.4	949
1982	86.3	71.8	58.8	54.6	51.9	51.8	48.0	55.7	65.4	74.8	78.7	75.8	773
1983	72.2	64.9	56.5	52.1	46.3	41.6	48.0	51.2	54.0	62.5	70.5	69.1	689
1984	69.6	58.7	49.6	52.1	57.2	62.5	68.4	71.2	75.3	77.3	79.0	82.0	803
1985	83.6	73.3	72.3	77.1	75.7	74.3	75.4	75.5	80.1	83.2	85.0	84.9	940
1986	86.5	84.4	80.5	76.0	52.5	48.1	59.1	65.9	73.5	76.6	78.7	82.1	864
1987	85.1	85.6	82.2	80.0	75.7	71.9	74.3	77.7	80.8	83.4	86.4	88.5	972
1988	83.7	84.8	80.5	73.2	74.6	75.1	78.0	79.5	81.0	85.2	87.8	87.3	971
1989	84.7	84.5	83.7	82.8	80.2	68.2	68.7	74.0	79.6	83.0	86.2	84.2	960
1990	85.2	84.9	84.5	78.8	76.4	75.7	76.0	78.0	81.0	85.2	86.9	87.1	980
Avg.	84.0	81.6	76.3	70.9	65.9	65.0	67.2	69.8	74.7	79.2	81.6	83.4	900

Run Date 4- 1- 99
X2 Position (Roe=64 Chipps=74 Conflu=81)
TRN_RECD = PROSIM99;TRINITY R EIS/EIR EXIST. CONDITIONS;C06A;BDPA;1993 WRBO;L2 R
Equation is +x2_pos 30
Report is in ascending order by year Units are in TAF

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	82.9	84.3	81.1	77.6	67.1	66.4	68.2	62.5	64.4	74.4	79.6	82.6	891
1923	84.6	81.6	69.2	65.1	66.9	72.5	69.8	73.8	77.2	80.2	81	83.2	905
1924	85.9	85.3	82.1	81.2	78.5	77	81	82.2	85.6	86.7	88.2	89	1003
1925	88.8	86.8	83.6	82.8	65.5	65.3	68.2	73.2	77	80.1	83.2	83.7	938
1926	86.1	85.9	84.6	81.1	68.9	73.3	71.2	74	79.6	81.9	85.9	85.7	958
1927	86.7	77.6	75	68.1	55.3	58.5	59	65.6	73.2	77.3	80.2	84.2	861
1928	85.6	75.3	79	72.8	68.5	56.3	63.7	70.2	76.7	78.5	79.6	82.5	889
1929	85.7	83.9	81.4	79.9	77.8	77.1	79.3	81	80.8	83.4	86.7	87.7	985
1930	86.6	86.6	82.4	76.6	75.1	70.4	74.2	77.4	80.7	83.4	86.3	84.8	965
1931	86.4	86	84.6	82	79.7	80	79.8	82	85.3	86.6	88.2	89.7	1010
1932	86.1	85.1	77.9	74.4	69.2	73.7	74.8	76.6	76.3	81.9	85.2	84.6	946
1933	86.3	85	83.1	81.5	79.9	78.2	76.9	80.6	80.9	85.1	87.7	89.6	995
1934	87.7	86	82.5	78.9	76	75.5	76.1	81	81	85.2	87.8	88.8	986
1935	85.8	83.7	83.9	73.2	74.6	70	62.8	64.6	73.5	79	80.8	83.4	915
1936	85.5	85.2	81.9	69.9	58	61.1	66.4	72	75.9	79.8	82.5	84.3	902
1937	86.3	85.9	81.9	81.1	66.4	60.7	65.2	70	74.3	79.3	81.5	84.2	917
1938	86.2	77.1	62.8	63.6	52.3	46.8	51.1	53.1	58.8	71.1	76.9	76.7	777
1939	74.4	76	75.7	74.6	75.3	76.1	76.3	78.7	81	82.6	85.1	85.2	941
1940	84.3	83	82.2	70.4	60	53.1	55.3	66.9	75.7	78.1	79.6	82.7	871
1941	85.7	85	68.7	56.4	50.9	50.9	52.6	58	66.9	75.2	79	79.7	809
1942	77.7	76.3	62.1	55.4	49.2	59	58.8	61.2	65.9	74.9	79	80.6	800
1943	78.5	72.9	68.1	57.1	56.6	53.1	60.7	68.3	76.1	78.3	80.2	84.1	834
1944	85.9	84.6	83.6	80.5	70.8	69.2	75.4	78.1	78.7	81	83.3	84.3	956
1945	86.2	83	78.1	80.2	64.5	65	71.8	76.1	76.6	80	81.1	83.9	927
1946	86	79.6	62.9	59.9	65.6	67.9	73.4	74.8	77.1	80.2	81	83.2	892
1947	85.9	84.3	81.7	81.3	77	74	74.9	78.3	80.3	81.3	83.3	84	966
1948	85.4	84.7	84.5	82.5	77.6	75.3	69.9	67.3	71.7	77.2	80	81.9	938
1949	84.3	84.7	81.5	81.1	79.7	67.5	73.6	74.9	78.5	81.7	84.7	84.4	957
1950	86.3	85.9	84.9	76.9	68.8	70.3	71.3	74	76.9	79.1	81.1	83.1	939
1951	84.5	68	57.3	55.3	55.6	60.8	69	72.6	77.5	78.7	79.4	82.3	841
1952	85.6	81.3	67.3	56.4	54.4	53.6	54.1	54.4	59.4	68.5	74.1	74.8	784
1953	74.9	76.8	65.8	55.4	62.6	67.3	71.7	69.9	70.4	76.4	78.8	81.7	852
1954	82.2	76.8	77.8	68.8	60.8	59.3	60.8	67.1	75.7	78.1	79.2	82.3	869
1955	85.6	82.1	75.1	73.7	74.8	77.1	78.7	79.5	79.2	81.3	83.6	84	955
1956	86.1	85	62.2	50.5	51	57.8	66.2	63	68.6	75.8	78.4	78.1	823
1957	76.4	81.6	82.9	78.7	68.5	62.6	68.9	72.5	76.3	78.3	79.5	82.3	909
1958	78	79.5	74.6	66.8	51.4	50	50.1	56.1	60.2	72	75.5	73.6	788
1959	74.6	77.6	79.7	67.9	61.6	67.9	75.3	77.7	80	81.1	81	82.6	907
1960	85.7	85.6	82.1	81	72.4	72.1	74.2	78.1	80.7	81.1	83	83.5	960
1961	86	84	82.2	81.9	71.8	73.1	75.5	78	80.9	82.4	86	85.4	967
1962	86	85.4	82.2	82.5	65.6	65.5	72.2	74.3	78.9	80.7	81.2	83.3	938
1963	72	78.4	72.8	76.3	61.6	63.9	55.7	62.7	72.7	77.1	79.5	80.8	854
1964	80	70.5	78.7	71.3	74	76.3	78.7	79.5	80.8	81	83.4	84.3	939
1965	84.7	82.8	62.4	53.1	60.8	67	62	66.6	74.9	77.9	79	83.7	855
1966	86.1	74.5	77.4	69.5	69.3	70.1	74.2	75.1	79.1	80.8	81	83.1	920
1967	85.8	80.1	68.8	61.8	59.1	56.6	56.8	56.8	59.2	66	73.2	74	798
1968	74.3	76.8	75.3	67.9	59.7	61.8	71.4	76.7	79.6	81	81	83.1	889
1969	85.8	84	75.1	56.8	49.9	52.5	54.6	55.9	61.6	71.5	76.3	74.4	799
1970	73.6	75	63.2	49	50.9	57.7	69.7	76.4	78.8	79.1	79.9	83.1	836
1971	85.9	75.9	62.8	60.3	65.1	61.1	67.8	67.6	71.1	76.6	78.7	80.8	854
1972	81.8	82.6	76.8	73.5	71.5	67.5	74	77.3	79.9	81.1	80.7	82.5	929
1973	84.2	77.1	73.4	60.3	54.6	55.7	66.6	71.9	74.5	77.7	79.6	82.8	858
1974	83.9	64.8	58.3	51.2	57.3	51.7	53.7	63.9	69.3	74.8	77	77	783
1975	77.5	78.1	76.3	74.9	61.7	54.9	63.7	65	67.9	75.6	77.9	78.8	852
1976	75.8	75.9	77.7	78.6	78.6	77.7	79	80.3	81	85.1	84.6	85.2	960
1977	86.9	86.1	85.4	83.5	80.1	79.7	81	82	85.5	86.7	88.2	88.7	1014
1978	85.8	86.3	82.8	65	60.1	55.3	57.9	64.9	73.4	77.4	80.6	79.6	869
1979	84.7	84	84.1	72.7	63.5	62.6	70	73.8	75.1	79.5	81	83.8	915
1980	85.6	82.2	78.7	58.6	50.4	53.8	64.5	70.5	75.6	78.1	79.9	82.1	860
1981	83.9	84	78.9	69.6	67.7	66.2	71.7	77.2	80.6	81.2	83.1	83.7	928
1982	86.1	72.2	59.1	54.6	51.5	51.3	48	56	64.2	72.4	75.2	72.8	763
1983	69.5	63.3	55.7	51.5	46.1	41.5	47.9	51.1	53.5	60.7	67.6	66.7	675
1984	69.1	58.6	49.6	52.2	57.8	61.3	69.8	76.6	77.5	78.7	79.6	83	814
1985	84.2	70.8	71.2	77.2	74.6	73.4	77.4	76.9	80.6	81.2	83.5	84	935
1986	86	84.6	81.9	76.9	52.3	47.9	60.9	69.5	75	77.9	80.6	83.4	877
1987	86	85.9	82.4	80.2	76.2	72.4	74.4	78.1	80.9	82.7	85.3	85.4	970
1988	83.8	83.6	81.4	73.8	74.8	78.2	79.5	80	81	85.2	87.8	87.5	977
1989	85.3	85	84.4	83.1	80.3	67.9	70.3	74.1	79.7	81.7	84.8	83.7	960
1990	86.1	85.7	85.2	80.9	77.1	78.3	77.1	78.9	81	84.2	87.1	87.1	989
Avg.	83.2	80.5	75.6	70.3	65.4	64.9	68.1	71.4	75.2	79	81.4	82.6	898

Run Date 2-10- 99
X2 Position (Roe=64 Chipps=74 Conflu=81)
TRN_RM2K = PROSIM99;TRINITY R EIS/EIR MAX FLOW #2;C09A;BDPA;1993 WRBO;L2 REFS
Equation is +x2_pos 30
Report is in ascending order by year

Units are in TAF

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	82.6	84.0	79.7	76.9	66.7	66.1	68.5	64.0	65.0	74.6	78.3	82.1	889
1923	85.1	82.6	70.9	67.3	70.9	73.6	69.6	74.0	77.2	79.5	81.2	82.4	914
1924	85.6	85.8	82.8	81.4	78.1	76.9	81.0	82.9	85.7	86.7	88.3	89.7	1005
1925	88.3	86.5	82.6	82.0	64.5	65.0	67.7	74.0	77.0	81.2	83.8	84.0	936
1926	85.8	85.8	83.5	79.8	68.3	73.5	71.4	74.0	79.6	83.0	86.2	85.3	956
1927	86.6	76.7	77.2	69.5	55.6	58.8	59.2	66.4	73.8	77.5	78.5	82.1	862
1928	85.3	81.7	80.7	74.0	71.4	58.1	64.2	70.2	76.7	78.5	80.5	84.0	905
1929	86.2	84.3	82.1	80.2	77.9	77.1	79.3	81.0	80.8	85.1	87.7	89.1	991
1930	87.1	85.5	82.0	76.1	74.8	69.5	74.2	77.4	80.7	83.4	86.1	84.3	961
1931	86.2	86.0	84.2	81.9	79.8	80.1	79.8	81.1	85.0	86.5	88.2	89.2	1008
1932	85.9	85.5	77.2	74.3	69.5	73.6	74.8	76.6	76.3	81.9	83.6	84.7	944
1933	85.4	83.9	82.1	81.1	79.8	77.9	76.9	80.5	80.9	85.1	87.7	89.0	990
1934	87.2	85.8	82.0	78.8	75.7	75.4	76.0	80.8	81.0	85.2	87.8	89.6	985
1935	86.0	84.0	83.5	73.0	74.5	69.7	62.8	64.6	73.5	79.0	80.8	83.5	915
1936	86.0	85.9	82.6	70.4	58.3	62.4	67.2	73.3	77.0	80.1	81.1	83.1	907
1937	85.9	85.9	82.2	81.4	66.6	61.1	66.0	70.0	74.3	79.3	80.8	82.9	916
1938	85.8	77.0	64.8	65.2	53.6	47.4	51.5	53.5	59.5	72.8	78.3	79.8	789
1939	81.7	81.8	81.5	80.3	78.7	76.8	76.5	78.8	81.0	83.5	86.4	84.8	972
1940	84.6	83.1	82.3	70.9	61.2	53.5	55.3	66.9	75.7	78.1	80.0	82.9	875
1941	85.8	85.1	69.4	57.2	51.4	51.5	53.1	59.0	68.6	75.8	80.9	82.1	820
1942	84.0	82.9	65.1	56.9	49.8	59.4	59.1	62.0	67.3	75.4	80.5	82.5	825
1943	85.1	77.9	71.1	58.7	57.4	53.5	61.4	68.3	76.1	78.3	78.9	82.2	849
1944	85.6	85.3	82.1	80.0	72.5	71.4	75.4	78.4	78.7	82.7	84.5	84.4	961
1945	85.5	82.5	80.2	81.1	66.2	65.7	72.3	76.1	76.6	80.0	81.3	83.2	931
1946	85.9	83.5	65.3	61.3	65.6	70.4	74.6	75.2	77.1	80.2	81.5	84.2	905
1947	86.2	84.9	82.0	81.4	77.0	74.1	75.0	78.3	81.0	83.5	86.4	85.9	976
1948	86.8	84.9	85.1	82.6	77.7	75.2	69.4	67.1	71.9	78.1	80.6	83.1	942
1949	85.9	85.8	82.1	81.3	79.5	66.7	74.0	75.0	78.5	82.7	85.5	84.6	962
1950	85.9	85.9	84.5	76.0	68.5	70.1	71.6	74.1	76.9	80.1	81.2	83.3	938
1951	85.1	68.3	57.1	55.3	55.6	60.6	68.9	72.7	77.6	78.7	79.6	82.0	841
1952	85.3	82.7	68.3	57.0	54.8	54.4	54.7	55.1	60.4	71.3	77.2	78.7	800
1953	82.5	81.2	67.3	56.1	63.2	67.9	72.5	70.7	71.8	76.9	78.3	81.7	870
1954	85.4	82.8	81.8	73.6	63.2	60.9	61.8	67.1	75.7	78.1	80.0	83.5	894
1955	86.0	83.4	75.4	74.0	74.8	76.7	78.9	79.4	79.2	82.9	86.2	85.5	962
1956	86.1	84.2	61.3	50.2	50.9	57.4	66.4	63.6	69.7	76.2	78.3	82.7	827
1957	82.2	83.4	82.1	80.0	71.4	64.1	68.9	72.8	76.3	78.3	79.5	82.1	921
1958	80.2	81.5	76.3	68.2	52.4	50.7	50.5	57.1	61.5	73.3	78.3	78.6	809
1959	83.5	83.7	83.3	70.1	62.6	67.9	75.3	77.7	80.0	81.1	81.9	83.0	930
1960	84.2	83.6	81.9	81.0	72.3	72.8	74.4	78.1	80.9	83.4	85.5	85.9	964
1961	85.6	82.6	77.5	80.0	70.9	72.7	75.5	78.5	81.0	83.5	85.4	86.0	959
1962	84.8	84.2	79.1	81.4	65.2	65.4	72.2	74.3	78.9	80.7	81.5	83.8	932
1963	72.7	78.9	73.2	76.3	62.1	64.3	55.9	63.2	72.9	77.2	78.4	82.0	857
1964	84.6	74.6	79.0	72.5	74.4	77.3	79.0	79.6	80.8	83.4	86.4	85.1	957
1965	85.1	82.4	62.9	53.2	60.5	66.1	61.7	66.6	74.8	77.8	78.8	83.3	853
1966	85.9	77.8	79.7	70.3	69.4	70.5	74.2	75.1	79.1	80.8	82.0	84.4	929
1967	85.2	82.4	69.9	63.3	60.1	57.5	57.6	57.6	60.3	68.9	76.3	78.6	818
1968	82.2	82.0	81.4	70.5	61.2	62.5	71.4	76.7	79.6	81.0	81.1	83.4	913
1969	85.3	84.6	76.7	58.1	50.4	53.0	55.1	56.7	62.8	73.5	78.3	77.9	812
1970	81.0	80.6	65.6	50.0	51.4	58.1	69.7	76.0	78.6	78.6	79.1	82.0	851
1971	85.5	80.0	65.5	61.5	65.1	63.8	68.1	68.9	72.5	77.1	78.6	81.8	868
1972	85.4	84.3	79.6	77.4	73.8	70.5	74.0	77.3	79.9	80.8	82.6	84.4	950
1973	85.9	79.4	74.0	60.8	55.0	55.9	66.8	72.8	74.7	77.8	79.4	82.1	865
1974	85.0	67.4	59.5	51.8	58.6	52.6	54.1	65.5	71.3	76.4	79.0	80.9	802
1975	84.4	83.5	80.7	79.8	63.7	55.8	64.0	66.1	69.8	76.2	79.1	81.6	885
1976	79.4	79.5	81.2	80.2	79.2	78.3	79.0	80.8	81.0	85.2	87.8	86.6	978
1977	85.7	85.0	84.2	83.3	80.0	80.3	81.0	82.4	85.6	86.7	88.3	88.9	1011
1978	86.1	86.2	82.6	65.2	60.9	55.8	58.3	66.2	73.6	77.4	79.5	82.9	875
1979	85.8	84.2	82.6	74.0	65.7	64.4	70.4	75.3	75.6	79.7	80.7	83.3	922
1980	85.9	82.4	78.2	59.8	51.2	54.6	65.4	71.0	76.3	78.3	80.1	83.5	867
1981	85.0	85.3	82.0	74.9	71.3	68.2	74.3	78.1	81.0	83.5	85.6	84.5	953
1982	86.3	70.3	58.6	54.4	51.8	51.6	48.1	56.1	65.2	74.7	77.9	74.2	769
1983	73.4	65.2	56.8	52.0	46.4	41.7	48.1	51.6	54.0	61.7	69.1	71.1	691
1984	73.0	60.0	50.3	52.6	58.1	62.0	69.7	76.2	77.5	78.5	79.2	82.2	819
1985	85.1	73.9	72.8	77.2	76.8	75.7	77.4	76.9	80.6	83.3	86.3	85.5	952
1986	85.5	84.4	81.8	77.1	52.5	48.0	60.8	69.6	75.0	77.9	78.8	82.1	874
1987	85.5	85.8	82.2	80.0	75.9	72.1	74.3	78.1	81.0	83.5	86.4	88.6	973
1988	83.8	83.0	81.2	73.8	74.8	78.2	79.5	81.0	81.0	85.2	87.8	88.7	978
1989	85.4	84.7	84.2	83.1	80.3	67.6	69.9	74.1	79.7	83.0	86.1	84.2	963
1990	86.2	86.0	85.3	80.0	76.8	77.9	77.0	79.6	81.0	84.8	87.6	87.6	990
Avg.	84.6	81.8	76.4	71.0	66.0	65.4	68.3	71.7	75.5	79.6	82.0	83.5	906

Run Date 2-25- 99
X2 Position (Roe=64 Chipps=74 Conflu=81)
TRN_FES9 = PROSIM99;TRINITY R EIS/EIR FLOW EVAL STUDY;C09A;BDPA;1993 WRBO;L2 REF
Equation is +x2_pos 30
Report is in ascending order by year Units are in TAF

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	82.2	83.3	79.0	76.3	66.4	65.7	68.4	63.8	64.8	74.6	78.0	82.0	885
1923	84.6	81.5	70.4	66.8	70.7	73.5	69.6	73.6	77.2	79.0	80.8	82.3	910
1924	84.8	84.9	81.9	81.2	78.2	76.9	81.0	82.4	85.5	86.7	88.2	89.7	1001
1925	88.1	86.4	82.5	82.0	64.2	65.0	67.8	73.9	77.0	80.3	83.1	83.6	934
1926	86.0	85.6	83.7	80.3	68.5	73.5	71.3	74.0	79.6	83.0	86.2	85.8	958
1927	86.8	76.8	75.9	68.5	55.6	58.9	59.2	66.2	73.7	77.5	78.5	82.1	859
1928	85.0	77.2	78.8	73.4	71.2	58.0	64.2	70.2	76.7	78.5	79.5	82.4	895
1929	85.6	83.9	81.4	80.0	77.8	77.0	79.3	81.0	80.8	85.1	87.7	89.5	989
1930	87.3	86.5	82.4	76.4	74.9	69.7	74.2	77.4	80.7	83.4	86.0	84.3	963
1931	86.2	86.0	83.9	81.8	79.7	80.1	79.8	81.1	84.9	86.5	88.2	89.2	1007
1932	86.0	85.6	77.3	73.0	68.4	72.8	74.6	76.6	76.3	81.9	85.1	84.5	942
1933	85.7	84.0	82.3	81.2	79.9	77.9	76.8	80.7	80.9	85.1	87.7	89.0	991
1934	87.4	85.9	82.2	78.7	75.7	75.4	76.0	80.7	81.0	85.2	87.8	89.6	986
1935	86.3	84.0	83.9	73.1	74.6	69.8	62.7	64.6	73.5	79.0	80.1	82.5	914
1936	84.6	84.6	81.7	70.2	58.3	62.4	67.4	72.7	76.1	79.9	80.4	82.5	901
1937	85.7	85.3	81.8	81.1	66.7	61.3	66.3	70.0	74.3	79.3	80.3	82.5	914
1938	85.7	76.8	65.4	65.4	53.7	47.4	51.6	53.5	59.5	72.3	77.7	79.6	789
1939	80.4	81.3	81.2	78.9	78.0	76.7	76.4	78.8	81.0	83.5	84.9	85.3	966
1940	84.5	82.9	82.3	71.2	60.8	53.4	55.3	66.9	75.7	78.1	79.5	82.6	873
1941	85.7	84.8	68.7	57.0	51.2	51.3	52.9	58.5	68.2	75.7	79.7	81.0	815
1942	79.6	80.1	63.8	56.0	49.4	59.3	59.0	61.9	67.2	75.3	79.8	82.3	814
1943	81.5	75.5	70.0	58.0	57.0	53.3	61.3	68.3	76.1	78.3	78.9	82.2	840
1944	85.3	84.6	81.9	79.9	72.3	71.3	75.4	78.5	78.7	82.4	84.4	84.4	959
1945	85.8	81.8	80.0	81.0	66.0	65.6	72.2	76.1	76.6	79.2	81.0	82.8	928
1946	85.8	82.8	65.1	61.2	65.6	69.9	74.1	75.0	77.1	80.2	81.1	83.1	901
1947	85.8	84.2	81.8	81.4	76.9	74.0	75.0	78.3	81.0	83.5	86.4	87.0	975
1948	86.6	85.6	85.4	82.8	77.7	75.2	70.1	67.8	72.2	77.3	80.2	83.0	944
1949	85.3	84.7	81.6	81.1	79.5	66.9	74.0	75.0	78.5	82.7	85.5	85.0	960
1950	86.5	85.6	84.7	76.3	68.5	70.1	71.2	74.0	76.9	79.4	81.2	83.2	938
1951	84.5	69.0	57.1	55.3	55.7	61.0	68.8	72.5	77.5	78.7	79.3	81.9	841
1952	85.5	82.5	68.3	57.0	54.8	54.3	54.7	55.1	60.4	69.7	76.1	78.1	796
1953	78.2	78.1	66.2	55.5	63.0	67.9	71.9	70.3	71.7	76.8	78.4	81.8	860
1954	83.7	80.6	81.3	71.3	62.2	60.2	61.1	67.1	75.7	78.1	79.3	82.3	883
1955	85.6	82.6	74.8	73.5	74.7	76.9	78.9	79.5	79.2	82.9	86.2	85.4	960
1956	86.6	85.2	62.3	50.5	51.0	57.7	66.2	63.5	69.7	76.2	79.0	80.4	828
1957	77.9	82.0	82.2	80.1	70.6	63.7	68.9	72.9	76.3	78.3	79.2	81.9	914
1958	78.5	81.1	75.7	67.4	51.9	50.4	50.3	56.6	61.3	73.0	76.9	76.2	799
1959	79.0	82.5	82.8	69.0	62.2	67.9	75.3	77.7	80.0	81.1	81.1	82.5	921
1960	84.8	84.8	81.8	81.0	72.0	72.7	74.4	78.1	80.9	83.4	85.8	85.7	966
1961	86.5	83.9	82.1	81.6	71.6	72.8	75.5	78.5	81.0	83.5	86.1	86.1	969
1962	85.4	85.5	82.4	82.5	65.6	65.5	72.2	74.3	78.9	80.7	80.9	82.9	937
1963	72.3	78.1	72.4	76.0	62.2	64.2	55.8	63.1	72.9	77.1	78.4	82.0	854
1964	83.5	73.5	79.1	72.3	74.3	77.3	79.0	79.3	80.8	83.4	85.2	85.6	953
1965	84.7	82.2	62.8	53.1	60.5	66.4	61.7	66.6	74.8	77.8	78.8	83.3	853
1966	85.9	75.6	77.1	69.3	69.1	70.4	74.2	75.1	79.1	80.8	81.1	83.1	921
1967	85.4	82.3	69.4	62.8	60.0	57.4	57.3	57.4	60.2	68.1	75.6	78.4	814
1968	79.6	81.0	78.1	69.0	60.2	62.1	71.4	76.7	79.6	81.0	80.9	82.7	902
1969	84.9	83.8	77.1	57.9	50.3	53.0	55.0	56.5	62.7	73.1	77.7	77.3	809
1970	77.3	77.4	63.9	49.3	51.1	58.0	69.7	76.0	78.6	78.5	79.1	82.0	841
1971	85.5	77.1	63.5	60.9	65.1	63.3	68.1	68.4	72.3	77.0	78.5	81.8	861
1972	84.5	83.9	78.0	75.2	73.0	69.1	74.0	77.3	79.9	80.5	81.5	83.1	940
1973	84.2	78.5	73.9	60.5	54.8	55.8	66.8	72.8	74.7	77.8	79.0	81.8	860
1974	83.2	66.4	58.8	51.4	58.4	52.2	53.9	65.2	71.2	75.7	78.1	79.3	794
1975	81.9	82.7	80.1	78.5	62.9	55.4	63.9	65.8	69.7	76.1	78.6	80.2	876
1976	76.3	78.0	80.7	80.6	79.4	77.7	79.0	80.7	81.0	83.2	86.3	85.6	969
1977	86.3	85.4	84.3	83.1	79.9	79.6	81.0	82.6	85.7	86.7	88.3	89.0	1012
1978	86.1	86.3	82.6	65.0	59.3	55.3	58.2	65.9	73.6	77.4	79.0	82.8	871
1979	85.7	84.3	81.8	74.4	65.9	64.5	70.4	74.6	75.3	79.6	80.4	82.2	919
1980	85.4	81.7	77.7	59.6	51.1	54.6	65.5	70.9	76.0	78.2	79.7	83.4	864
1981	86.0	85.8	82.2	74.2	71.1	68.2	74.3	78.1	81.0	83.5	84.3	84.1	953
1982	86.2	70.3	58.4	54.3	51.5	51.4	48.0	56.2	65.2	74.1	76.9	73.9	766
1983	72.4	64.8	56.3	51.6	46.1	41.5	47.9	51.3	53.7	61.3	68.3	67.9	683
1984	70.3	58.9	49.7	52.3	58.0	61.8	69.7	76.2	77.5	78.5	79.2	82.2	814
1985	83.7	73.1	72.3	77.1	76.7	75.4	77.4	76.9	80.6	83.3	85.5	85.1	947
1986	85.3	84.0	81.6	77.0	52.4	48.0	60.9	69.6	75.0	77.9	78.8	82.1	873
1987	85.5	85.8	82.2	80.0	75.9	72.1	74.3	78.1	81.0	83.5	86.3	88.5	973
1988	84.4	85.4	81.9	73.9	74.8	78.2	79.5	81.0	81.0	84.3	87.5	88.1	980
1989	86.0	85.0	84.3	83.1	80.3	67.6	70.1	74.1	79.7	83.0	85.8	84.2	963
1990	86.2	86.0	85.3	80.0	76.8	77.9	77.0	78.4	81.0	82.7	86.0	86.5	984
Avg.	83.9	81.3	76.1	70.7	65.9	65.2	68.3	71.6	75.5	79.4	81.6	83.1	903

Run Date 12-21- 98
X2 Position (Roe=64 Chipps=74 Conflu=81)
TRN_RPIA = PROSIM99;TRINITY R EIS/EIR % INFLOW ALT;C09A;BDPA;1993 WRBO;L2 REFS
Equation is +x2_pos 30
Report is in ascending order by year Units are in TAF

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	82.2	83.3	79.0	76.3	66.4	65.7	68.4	63.8	64.8	74.6	78.0	82.0	885
1923	84.9	81.6	70.5	66.8	70.7	73.5	69.6	73.6	77.2	79.0	80.8	82.3	911
1924	84.6	84.8	81.9	81.1	78.2	76.9	81.0	82.2	85.4	86.6	88.2	89.7	1001
1925	88.2	86.4	82.5	82.0	64.5	65.0	67.5	73.5	77.0	80.1	83.0	83.7	933
1926	86.1	85.8	83.8	80.0	68.4	73.4	71.0	74.0	79.6	83.0	86.2	85.9	957
1927	86.8	76.8	73.5	67.6	55.3	58.8	59.2	66.2	73.7	77.5	78.5	82.1	856
1928	85.2	77.2	78.8	73.4	71.2	58.0	64.2	70.2	76.7	78.5	79.5	82.4	895
1929	85.6	83.9	81.4	80.0	77.8	77.0	79.3	80.9	80.8	85.1	87.5	89.5	989
1930	87.5	86.1	82.2	76.3	74.9	69.7	74.2	77.4	80.7	83.4	85.9	84.2	962
1931	85.9	85.9	83.8	81.8	79.7	80.1	79.8	81.1	85.0	86.5	88.2	89.2	1007
1932	86.0	85.6	77.3	73.1	68.9	73.5	74.8	76.6	76.3	81.9	85.7	85.3	945
1933	86.0	84.5	82.7	81.3	79.9	77.8	76.8	80.7	80.9	85.1	87.7	89.4	993
1934	87.9	86.2	82.3	78.8	75.3	75.3	76.0	81.0	81.0	85.2	87.8	89.6	986
1935	86.6	83.8	83.6	72.9	74.5	69.8	62.6	64.6	73.5	79.0	80.1	82.5	914
1936	84.6	84.6	81.7	69.9	58.1	62.4	67.4	72.7	76.1	79.4	80.5	82.5	900
1937	85.7	85.3	81.8	81.1	66.7	61.1	66.2	70.0	74.3	79.3	80.3	82.5	914
1938	85.7	76.8	65.5	65.4	53.7	47.4	51.5	53.5	59.5	72.3	77.7	79.6	788
1939	78.6	80.8	81.0	78.7	77.9	76.6	76.4	78.8	81.0	83.5	86.4	85.5	965
1940	84.9	83.5	82.9	70.2	59.7	53.0	55.2	66.9	75.7	78.1	79.5	82.6	872
1941	85.7	84.8	68.7	56.9	51.2	51.3	53.1	58.8	67.7	75.5	79.6	80.4	814
1942	79.2	80.4	63.8	56.1	49.6	59.3	59.0	61.9	66.9	75.2	79.5	81.4	812
1943	80.4	75.2	70.1	58.1	57.1	53.4	61.3	68.3	76.1	78.3	78.9	82.2	839
1944	85.5	84.6	81.9	79.9	72.3	71.3	75.4	78.5	78.7	81.1	84.4	84.0	958
1945	86.2	82.7	78.4	80.3	65.2	65.4	72.1	76.1	76.6	79.7	80.8	82.7	926
1946	85.7	80.1	64.2	60.9	65.6	69.9	74.1	75.0	77.1	79.5	81.1	82.9	896
1947	85.8	84.2	81.8	81.4	76.9	74.0	75.0	78.3	81.0	83.5	86.4	86.9	975
1948	87.1	85.7	85.1	82.6	77.7	75.2	68.5	67.1	71.9	77.2	80.2	83.0	941
1949	85.3	84.6	81.5	81.1	79.5	67.0	74.0	75.0	78.5	81.8	85.1	84.8	958
1950	86.4	85.8	84.7	76.9	68.8	70.2	71.2	74.0	76.9	78.8	80.9	83.0	938
1951	84.4	68.8	57.4	55.4	55.8	61.0	68.8	72.5	77.5	78.3	79.3	81.9	841
1952	85.3	80.6	67.6	56.8	54.7	54.3	54.7	55.1	60.2	69.7	75.4	77.1	791
1953	77.6	77.9	66.2	55.5	63.0	67.9	72.4	70.4	71.7	76.8	78.5	82.0	860
1954	83.4	78.6	80.8	71.4	62.4	60.4	61.4	67.1	75.7	78.1	79.3	82.3	881
1955	85.6	81.2	74.3	73.4	74.6	76.9	78.9	79.5	79.2	82.8	86.0	85.5	958
1956	85.9	84.9	62.2	50.5	51.0	57.8	66.5	63.6	69.7	76.2	78.9	79.8	827
1957	77.0	81.9	81.6	79.9	71.2	64.2	68.9	73.6	76.3	78.2	79.3	81.9	914
1958	78.8	80.2	74.9	67.1	51.9	50.5	50.5	56.5	60.9	72.8	76.8	75.6	796
1959	78.6	82.3	82.7	69.3	62.4	67.9	75.3	77.7	80.0	81.1	81.1	82.5	921
1960	84.8	84.8	81.8	81.0	72.2	72.1	74.2	78.1	80.9	82.5	86.0	85.6	964
1961	86.7	83.4	82.0	81.7	71.8	72.9	75.5	78.4	81.0	83.5	86.0	86.2	969
1962	86.2	85.3	82.2	82.5	65.9	65.6	72.2	74.3	78.9	80.7	81.0	83.1	938
1963	72.3	78.1	72.4	76.0	62.0	64.2	55.8	63.1	72.9	77.2	78.4	82.0	854
1964	82.0	72.5	79.1	72.5	74.3	77.4	79.0	79.2	80.8	83.4	86.4	85.5	952
1965	84.9	82.4	62.1	53.0	60.6	66.4	61.7	66.6	74.8	77.8	78.8	83.2	853
1966	85.9	75.6	77.1	69.3	69.1	70.4	74.2	75.1	79.1	80.8	81.3	83.2	921
1967	85.5	81.9	69.3	62.8	59.7	57.2	57.2	57.4	60.2	68.1	75.6	77.7	813
1968	78.8	80.8	78.3	69.3	60.5	62.4	71.4	76.7	79.6	80.9	80.9	82.5	902
1969	84.6	83.7	74.9	57.3	50.1	52.9	55.0	56.5	62.8	72.9	77.5	76.7	805
1970	76.9	77.0	63.8	49.2	51.1	58.0	69.7	76.0	78.6	78.5	79.1	82.0	840
1971	85.5	75.5	63.0	60.7	65.1	63.3	68.1	68.5	72.3	77.0	78.6	81.8	859
1972	83.9	83.8	78.3	76.0	73.3	69.6	74.0	77.3	79.9	80.1	81.2	82.9	940
1973	84.3	76.4	72.8	60.2	54.8	56.0	66.8	72.8	74.7	77.5	79.0	81.8	857
1974	83.4	66.3	58.8	51.4	58.4	52.4	54.0	65.2	70.7	75.6	78.1	77.6	792
1975	81.1	82.5	80.3	78.4	62.8	55.5	63.9	65.8	69.7	76.2	78.5	78.9	874
1976	75.7	77.9	80.8	80.8	79.4	77.8	79.0	80.4	81.0	83.1	85.9	85.9	968
1977	87.5	86.7	86.2	83.8	80.1	79.7	81.0	82.7	85.7	86.7	88.3	89.0	1017
1978	86.1	85.8	82.4	64.6	59.2	55.2	58.1	65.9	73.6	77.4	79.0	82.8	870
1979	85.7	84.3	81.8	74.4	65.8	64.3	70.4	74.6	75.3	79.1	80.4	82.3	918
1980	85.0	81.6	77.7	59.7	51.2	54.6	65.5	70.9	76.0	78.2	79.7	83.4	864
1981	86.0	85.8	82.2	73.9	71.0	68.2	74.3	78.1	81.0	82.9	84.6	84.0	952
1982	86.2	70.9	58.7	54.4	51.5	51.5	48.1	56.2	65.2	74.1	76.9	73.9	768
1983	71.4	64.5	56.2	51.9	46.3	41.6	48.0	51.3	53.7	61.3	68.3	67.7	682
1984	70.1	58.9	49.7	52.4	58.0	62.0	69.7	76.2	77.5	78.5	79.2	82.2	815
1985	84.0	73.1	72.1	77.0	76.7	75.4	77.4	76.9	80.6	82.7	86.1	85.1	947
1986	86.2	84.7	81.8	75.1	51.8	47.8	60.9	69.6	75.0	77.9	78.8	82.1	872
1987	85.5	85.8	82.2	80.0	75.9	72.1	74.3	78.1	81.0	83.5	86.4	88.2	973
1988	84.2	84.1	81.5	73.6	74.7	78.2	79.5	81.0	81.0	85.2	87.8	88.7	979
1989	86.2	85.1	84.3	83.1	80.3	67.3	70.1	74.1	78.9	81.9	84.4	84.2	960
1990	86.2	85.9	85.3	80.2	76.9	77.9	77.0	78.7	81.0	84.3	87.2	88.0	989
Avg.	83.8	81.0	76.0	70.7	65.8	65.3	68.2	71.6	75.4	79.3	81.6	83.0	902

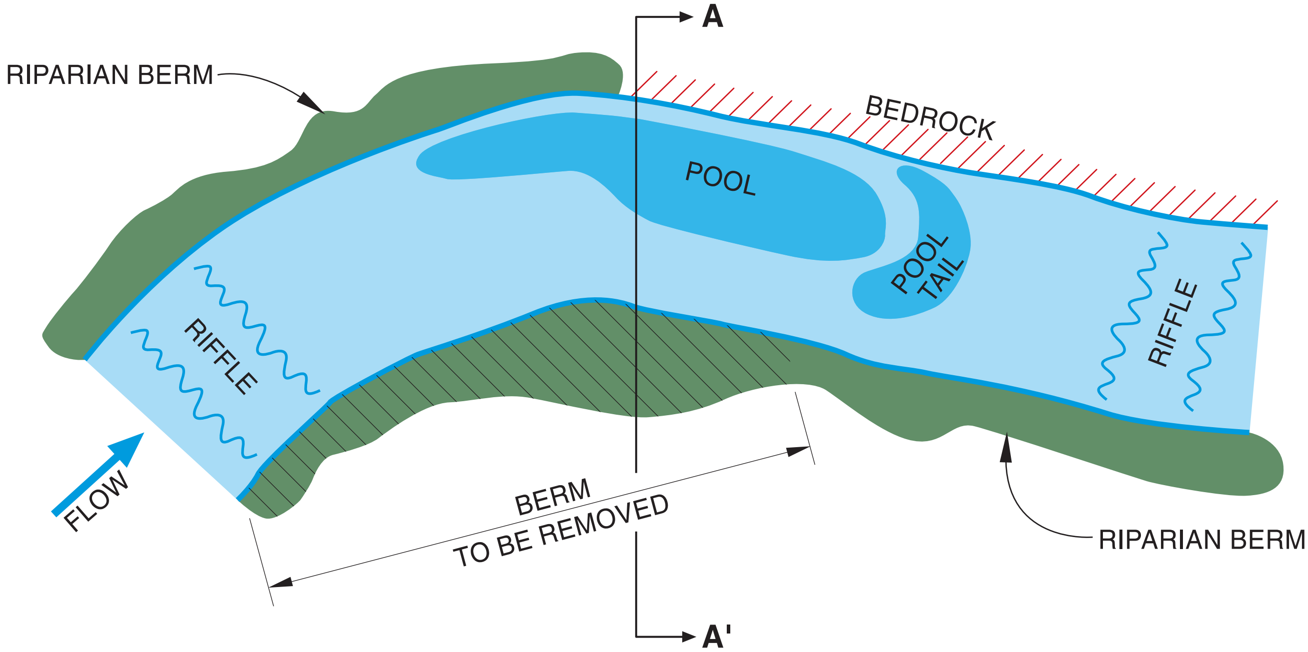
Run Date 1- 4- 99
X2 Position (Roe=64 Chipps=74 Conflu=81)
TRN_RSP6 = PROSIM99;TRINITY R EIS/EIR STATE PERMIT ALT;C09A;BDPA;1993 WRBO;L2 RE
Equation is +x2_pos 30
Report is in ascending order by year

Units are in TAF

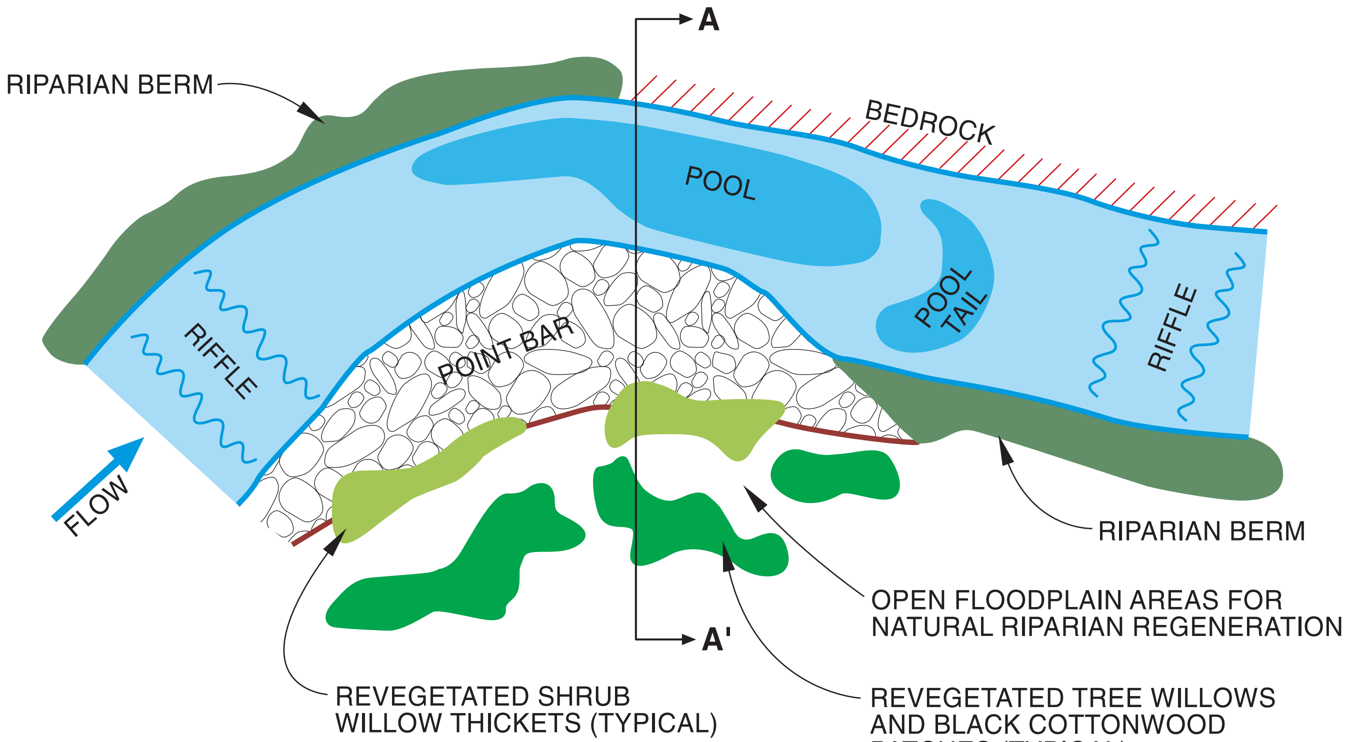
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1922	82.2	83.3	79.0	76.3	66.4	65.7	68.4	63.7	64.8	74.5	78.1	82.0	884
1923	84.6	81.5	70.4	66.8	70.7	73.5	69.6	73.6	77.2	79.0	80.8	82.3	910
1924	84.7	84.8	81.9	81.2	78.2	76.9	81.0	82.3	85.5	86.6	88.2	89.7	1001
1925	88.5	86.5	82.6	82.0	64.5	65.0	67.0	73.2	77.0	80.2	83.0	83.1	933
1926	85.9	85.6	83.7	80.0	68.4	73.4	70.9	74.0	79.6	83.0	86.2	85.5	956
1927	86.7	76.7	74.7	67.9	55.2	58.8	59.2	66.0	73.6	77.4	78.5	82.1	857
1928	83.4	75.7	77.8	72.9	70.9	57.6	64.1	70.2	76.7	78.5	79.6	82.4	890
1929	85.6	83.9	81.4	80.0	77.8	77.0	79.3	81.0	80.8	83.8	87.3	89.4	987
1930	88.4	86.8	82.4	76.3	74.8	69.9	74.2	77.4	80.7	83.4	86.2	84.4	965
1931	86.3	86.0	84.2	81.9	79.7	80.1	79.8	81.6	85.1	86.5	88.2	89.5	1009
1932	86.4	85.8	77.3	74.3	69.4	73.7	74.8	76.6	76.3	81.9	85.3	85.1	947
1933	86.5	85.4	83.1	81.4	79.9	77.9	76.8	80.8	80.9	85.1	87.7	89.6	995
1934	87.7	86.1	82.4	78.9	76.2	75.6	76.1	80.9	81.0	85.2	87.8	89.0	987
1935	86.4	83.8	83.7	73.0	74.5	69.8	62.6	64.6	73.5	79.0	80.1	82.4	914
1936	84.6	84.6	81.7	69.9	58.1	62.4	67.4	72.7	76.1	79.2	80.5	82.5	900
1937	85.7	85.3	81.8	81.1	66.7	61.2	66.2	70.0	74.3	79.3	80.3	82.5	914
1938	85.7	76.8	64.7	65.1	53.7	47.4	51.4	53.2	58.8	71.9	77.3	78.4	784
1939	77.5	80.3	80.3	76.9	77.0	76.4	76.3	78.7	81.0	83.5	86.4	85.2	960
1940	85.8	84.5	83.2	71.1	59.8	53.0	55.2	66.9	75.7	78.1	79.5	82.6	875
1941	85.7	84.5	68.0	56.5	50.9	51.0	52.7	58.2	67.2	75.3	79.5	80.3	810
1942	79.2	80.0	63.6	55.9	49.4	59.3	59.0	61.3	65.8	74.9	79.4	81.4	809
1943	80.5	75.1	69.9	57.9	56.9	53.3	61.2	68.3	76.1	78.3	78.9	82.2	838
1944	84.9	84.3	81.8	79.9	72.3	71.3	75.4	78.3	78.7	81.3	84.2	84.1	957
1945	86.2	81.9	77.9	80.1	65.1	65.4	72.2	76.1	76.6	80.0	80.8	82.7	925
1946	85.5	78.4	63.5	60.7	65.6	69.9	74.1	75.0	77.1	78.9	80.8	82.5	892
1947	85.7	84.0	81.7	81.4	76.9	74.0	75.0	78.3	81.0	83.5	86.4	85.9	974
1948	86.8	85.5	85.2	82.5	77.6	75.1	68.4	66.6	71.8	77.2	80.2	83.0	940
1949	85.3	84.6	81.5	81.1	79.5	66.9	74.0	75.0	78.5	81.9	85.2	84.9	959
1950	86.5	85.8	84.8	76.7	68.7	70.1	71.2	74.0	76.9	79.4	81.2	83.3	939
1951	83.7	67.3	56.6	54.9	55.1	60.8	68.7	71.9	77.3	78.2	79.3	81.9	836
1952	84.9	80.4	67.2	56.6	54.5	54.0	54.3	54.6	59.6	69.5	75.4	77.1	788
1953	77.7	78.0	66.1	55.4	63.0	67.9	71.5	69.6	70.4	76.4	78.8	81.9	857
1954	82.5	78.3	80.7	70.8	62.0	60.1	61.0	67.1	75.7	78.1	79.3	82.3	878
1955	85.4	81.1	74.3	73.4	74.6	76.9	78.9	79.5	79.2	82.3	85.2	84.4	955
1956	86.3	85.0	62.0	50.4	51.0	57.8	65.8	62.8	68.6	75.8	78.6	79.2	823
1957	76.8	81.7	82.9	80.4	70.0	63.5	68.9	72.6	76.3	78.2	79.3	81.9	913
1958	76.8	79.1	74.3	66.8	51.7	50.3	50.3	56.4	60.5	72.5	76.8	75.5	791
1959	78.6	82.0	82.6	69.1	62.0	67.9	75.3	77.7	80.0	81.1	81.1	82.5	920
1960	84.8	84.8	81.8	81.0	72.2	72.0	74.2	78.0	80.9	82.2	85.2	85.3	962
1961	86.6	83.3	79.0	80.5	71.1	72.6	75.5	78.4	81.0	83.5	86.4	85.9	964
1962	86.3	85.4	81.6	82.0	65.4	65.5	72.2	74.3	78.9	80.7	80.9	82.9	936
1963	71.1	77.7	72.3	75.9	61.9	64.1	55.7	62.2	72.9	77.2	78.3	82.0	852
1964	80.5	72.0	78.9	71.9	74.2	76.4	78.6	79.1	80.8	82.2	85.2	85.8	946
1965	85.8	82.6	62.4	53.0	60.3	66.3	61.7	66.6	74.8	77.8	78.8	83.2	853
1966	85.9	74.0	76.0	68.8	68.9	69.9	74.2	75.1	79.1	80.8	81.1	83.1	917
1967	85.5	79.6	68.5	62.5	59.2	56.9	57.1	57.0	59.4	67.4	74.9	76.4	804
1968	78.4	80.7	77.9	68.9	60.2	62.1	71.4	76.7	79.6	81.0	80.9	82.7	900
1969	84.9	83.3	74.6	57.1	50.0	52.9	54.9	56.0	61.8	72.5	77.3	76.4	802
1970	76.5	76.5	63.6	49.2	51.0	57.9	69.7	76.0	78.6	78.5	79.1	82.0	839
1971	85.3	75.0	62.8	60.6	65.1	62.6	68.1	67.4	71.1	76.6	78.3	81.8	855
1972	83.3	83.0	76.3	74.6	72.8	69.0	74.0	77.3	79.9	81.1	81.1	82.8	935
1973	84.1	75.9	72.7	60.1	54.7	55.9	66.7	71.5	74.5	77.4	79.0	81.8	854
1974	81.5	65.5	58.5	51.3	58.4	52.1	53.9	64.0	69.6	75.3	77.9	77.3	785
1975	81.0	82.4	79.9	77.4	62.5	55.2	63.8	64.9	68.1	75.6	78.4	79.0	868
1976	75.8	77.8	80.6	80.6	79.3	77.7	79.0	80.3	81.0	82.5	86.2	85.6	966
1977	88.5	87.1	86.3	84.4	80.3	79.7	81.0	82.6	85.7	86.7	88.3	88.9	1020
1978	86.1	86.8	82.8	64.3	59.1	55.0	58.1	65.7	73.6	77.4	79.1	82.8	871
1979	85.8	84.3	82.4	73.9	65.4	64.2	70.4	74.0	75.2	79.5	80.4	82.3	918
1980	84.2	81.3	76.9	59.0	50.8	54.4	65.4	70.9	76.0	78.2	80.2	83.6	861
1981	84.2	84.1	81.8	71.8	69.9	67.3	74.3	78.1	81.0	83.5	84.9	84.3	945
1982	86.2	70.0	58.2	54.2	51.4	51.3	48.0	56.0	64.1	73.3	76.0	73.0	762
1983	70.8	64.2	56.1	51.6	46.1	41.5	47.9	51.2	53.7	61.3	68.3	67.6	680
1984	70.1	58.9	49.7	52.3	58.0	61.7	69.6	76.2	77.5	78.5	79.2	82.2	814
1985	83.0	71.7	71.2	76.9	76.6	74.6	77.4	76.9	80.5	82.4	86.0	84.8	942
1986	86.4	84.6	81.5	76.4	52.1	47.8	60.7	69.5	75.0	77.9	78.8	82.1	873
1987	85.5	85.8	82.2	80.0	75.9	72.1	74.3	78.1	81.0	83.5	86.4	88.6	973
1988	86.1	85.8	82.0	73.8	74.8	78.2	79.5	81.0	81.0	83.8	87.3	87.8	981
1989	86.2	85.1	84.3	83.1	80.3	67.5	70.2	74.1	79.1	82.3	86.0	84.1	962
1990	86.2	86.0	85.4	79.9	76.8	77.9	77.0	78.7	81.0	82.9	86.8	87.1	986
Avg.	83.6	80.8	75.8	70.5	65.7	65.1	68.2	71.4	75.2	79.2	81.6	82.9	900

Attachment 5

Figures for Response 6314-68



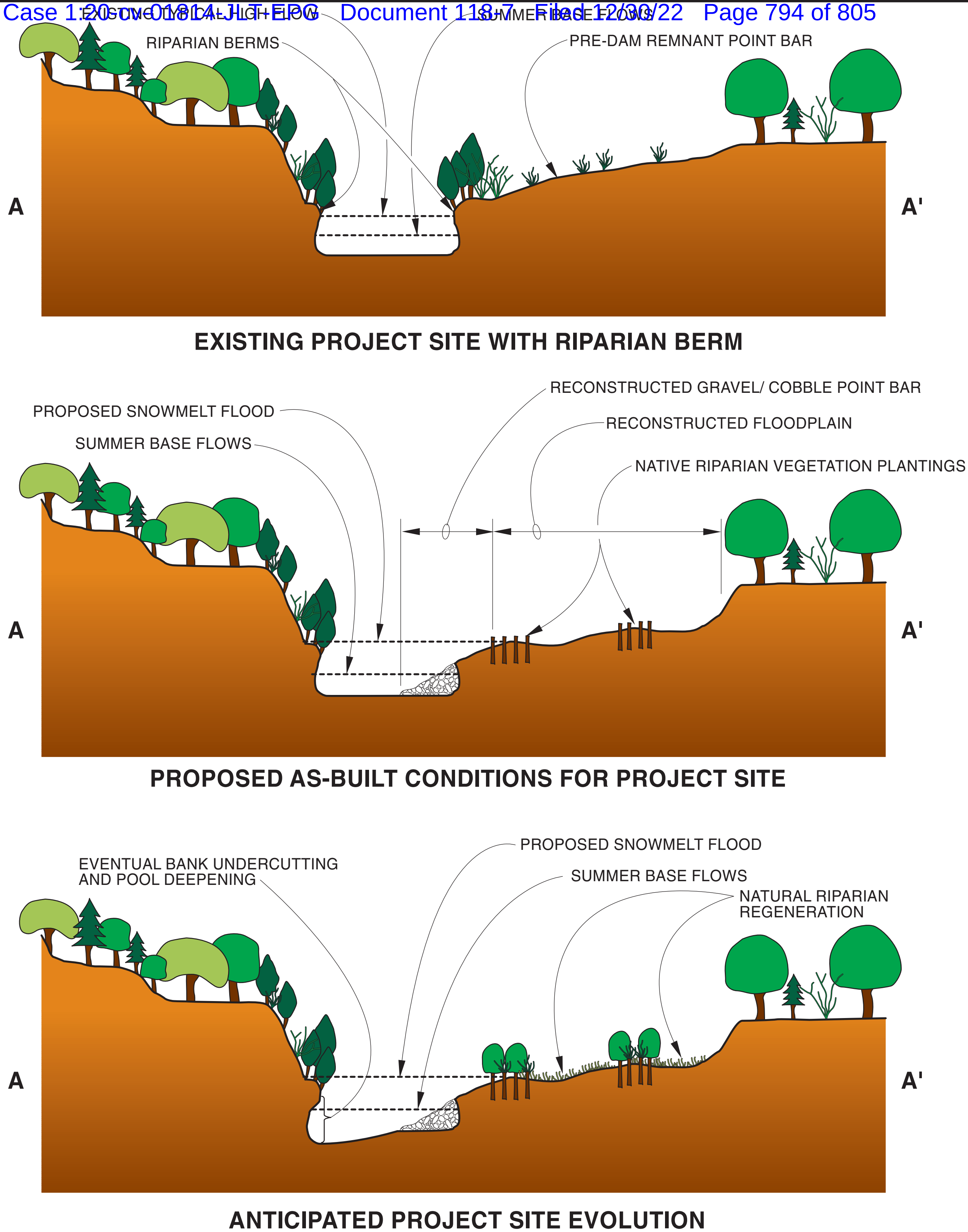
HYPOTHETICAL EXISTING CHANNEL AND RIPARIAN BERM



POTENTIAL REHABILITATED CHANNEL AND REVEGETATED FLOODPLAIN

FIGURE 6314-68A
PLAN VIEW EXISTING AND POTENTIAL CHANNEL
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

3003_32 (7/13/00)



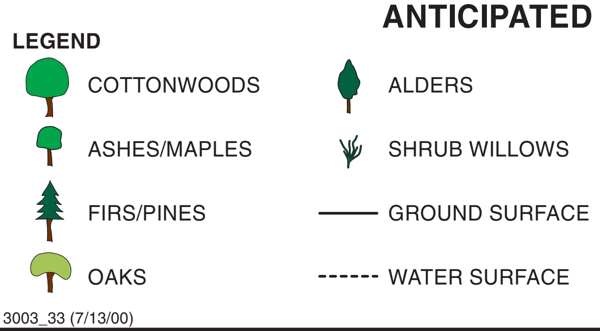


FIGURE 6314-68B
CROSS-SECTION A-A' OF EXISTING, PROPOSED, AND ANTICIPATED CHANNEL
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

Attachment 6

References for Responses to Comments

ATTACHMENT 6

References for Responses to Comments

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Attachment 7

List of Abbreviations and Acronyms

ATTACHMENT 7

List of Abbreviations and Acronyms

°C	degrees Celsius
°F	degrees Fahrenheit
ACHP	Advisory Council on Historic Preservation
ACS	Aquatic Conservation Strategy
AEAM	Adaptive Environmental Assessment and Management
af	acre-feet
af/ yr	acre-feet per year
AFRP	Anadromous Fish Restoration Program
APE	Area of Potential Effect
Bay-Delta	San Francisco Bay/ Sacramento-San Joaquin Delta
Bay-Delta WQCP	Bay-Delta Water Quality Control Plan (1995)
BETTER	Box Exchange Transport Temperature and Ecology of Reservoirs Model
BIA	Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
BO	Biological Opinion
BOR	U.S. Bureau of Reclamation
BRD	Biological Resources Division
CAISO	California Independent System Operator
Cal PX	California Power Exchange
Caltrans	California Department of Transportation
CALTRANS	California Department of Transportation
Carr Powerplant	Judge Francis Carr Powerplant
CCWD	Contra Costa Water District
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality

CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	California Federal Register
cfs	cubic feet per second
CNPS	California Native Plant Society
COA	Coordinated Operations Agreement
Commission	California Fish and Game Commission
Corps	U.S. Army Corps of Engineers
COTR	Contracting Officer's Technical Representative
CRD	Contract Rate of Delivery
CVGSM	Central Valley Goundwater-Surface Water Simulation Model
CVPIA	Central Valley Project Improvement Act
CVPM	Central Valley Production Model
CWA	Clean Water Act
DBCP	dibromochloropropane
DEIS/EIR	Draft EIS/EIR
DOC	dissolved organic carbon
DOI	U.S. Department of the Interior
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utility District
EC	electrical conductivity
EDB	ethylene dibromide
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FACA	Federal Advisory Committee Act
FCRT	Fish and Channel Restoration Team
FEIS/EIR	Final EIS/EIR

FEMA	Federal Emergency Management Agency
FPR	Forest Practic Rules
FR	Federal Register
ft	feet
ft^3/s	cubic feet per second
FTE	Full Time Equivalent
FWCA	Fish and Wildlife Coordination Act
GIS	Geographic Information Systems
GVC	Grass Valley Creek
GWh	gigawatt-hour
HMA	Harvest Management Alternative
Hoopa EPA	Hoopa Valley Tribe Environmental Protection Agency
Hoopa Valley WQCP	Hoopa Valley Tribe Water Quality Control Plan
HVTC	Hoopa Valley Tribal Council
JCW	Junction City Weir
KFMC	Klamath Fishery Management Council
km	kilometer
KMZ	Klamath Management Zone
kW	kilowatt
kWh	kilowatt-hour
LCVP	Long-term Central Valley Project
LKRP	Lower Klamath Restoration Partnership
LSACTEM3	Sacramento River Basin Temperature Model
LSALMON2	Sacramento River Salmon Mortality Model
M&I	municipal and industrial
maf	million acre-feet
MCL	maximum contaminant level
MMBtu	one million British thermal unit
MOA	Memorandum of Agreement
msl	mean sea level

MW	megawatt
MWh	megawatt-hour
NCRWQCB	North Coast Regional Water Quality Control Board
NCUAMD	North Coast Unified Air Management District
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	Natural Stock Assessment
O&M	Operations and Maintenance
OCAP	Operations Criteria and Plan
P.L.	Public Law
PA	Preferred Alternative
PEIS	Programmatic Environmental Impact Statement
PFMC	Pacific Fishery Management Council
PG&E	Pacific Gas and Electric Company
PM_{10}	particulate matter 10 microns or less in diameter
Porter-Cologne	Porter-Cologne Water Quality Control Act
ppt	parts-per-thousand
PUD	Public Utility District
PWA	Pacific Watershed Associates
RCH	Rowdy Creek Hatchery
Reclamation	U.S. Bureau of Reclamation
RFP	Request for Proposal
RIG	Rehabilitation Implementation Group

RM	River Mile
ROD	Record of Decision
RTM	Reclamation Temperature Model
RVD	recreation visitor day
SAB	Scientific Advisory Board
Secretary	Secretary of the Interior
Service	U.S. Fish and Wildlife Service
SF CRMP	South Fork Trinity River Coordinated Resources Management Program
SLC	State Lands Commission
SMARA	Surface Mining and Reclamation Act
SMUD	Sacramento Municipal Utility District
SNTEMP	Stream Network Temperature Model
SOD	Safety-of-Dam
SONCC	Southern Oregon/ Northern California Coast
SPI	Sierra Pacific Industries
SRF	Sequential Rearing Factor
SRNF	Six Rivers National Forest
STNF	Shasta-Trinity National Forest
SWP	State Water Project
SWRCB	State Water Resources Control Board
taf	thousand acre-feet
TAF	thousand acre-feet
TAMWG	Trinity Adaptive Management Working Group
TCRCD	Trinity County Resource Conservation District
TDS	total dissolved solids
THM	trihalomethanes
TMAG	Technical Modeling and Analysis Group
TMC	Trinity Management Council
TMDL	Total Maximum Daily Load

TRD	Trinity River Diversion
TRFES	Trinity River Flow Evaluation Study
TRH	Trinity River Hatchery
TRRP	Trinity River Restoration Program
TRSAAM	Trinity River System Attribute Analysis Methodology
TRSSH	Trinity River Salmon and Steelhead Hatchery
TTHM	total trihalomethanes
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WCW	Willow Creek Weir
WDR	Water Discharge Requirement
Western	Western Area Power Administration
WOMTT	Water Operations/ Management Technical Team
WY	water-year
yd^3	cubic yards
yd^3/ yr	cubic yards per year
YT	Yurok Tribe